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Comprehensive Diagnostic Evaluation and Selected Management Issues

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The Comprehensive Diagnostic Evaluation process presented in this publication was specifically designed to assist local government officials and wastewater utility managers in effectively evaluating the management and operation of wastewater utilities and developing and implementing management solutions to achieve water quality compliance and cost control.

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CHAPTER I

COMPREHENSIVE DIAGNOSTIC EVALUATION

INTRODUCTION

Over the past decade, communities of all sizes have invested heavily in constructing or upgrading wastewater facilities designed to meet Federal and state treatment standards. These facilities, now on-line or about to come on-line, are substantially more complex and expensive to operate than the average wastewater facility of the 1940s and 1950s. Recent surveys have concluded that many of these new or upgraded facilities are not in compliance with Federal and state standards. A significant cause of the failure to consistently remain in compliance and to operate efficiently is the inadequacy of a utility's management system.

According to current utility management literature and the results of a study conducted in the northeastern states, a utility is more likely to achieve compliance and efficiency when operated on a self-sustaining basis. While no definition applies to all cases, there is general agreement that self-sustaining utilities are those that manage their own decisions and support them financially. The activities or functions required in a self-sustaining utility include:

- General management;
- Support services
  - financial management
  - engineering
  - personnel
  - purchasing
  - management information; and
- Facility management
  - operations
  - maintenance

An approach has been developed to evaluate management functions according to the characteristics of a self-sustaining utility model. Called the Comprehensive Diagnostic Evaluation (CDE), this method brings together both management and operational issues in a single analysis. The Comprehensive Diagnostic Evaluation process presented in this chapter was specifically designed to assist local government officials and wastewater utility managers in effectively evaluating the management and operation of wastewater utilities and developing and implementing management solutions to achieve water quality compliance and cost control.

The chapter presents the Comprehensive Diagnostic Evaluation in three parts:

- Introduction - when and why a Comprehensive Diagnostic Evaluation is required, how the results are used, and who can perform one.
- Approach to performing a Comprehensive Diagnostic Evaluation.
- How to Examine Utility Functions, including critical issues that should be evaluated in each wastewater utility function.

When and Why Is It Required?

A Comprehensive Diagnostic Evaluation is effective when:

- the wastewater utility is not in compliance with Federal or state water quality standards;
- the utility's operation and maintenance costs are increasing at a rapid rate and consistently exceed budget projections;
- local officials desire a periodic review to ensure that operations and maintenance are as efficient and cost-effective as possible.

Why Is It Effective?

A Comprehensive Diagnostic Evaluation is effective because it approaches the wastewater utility's functions in a systematic and comprehensive manner. This offers the advantage of being able to assess the entire utility as an operating unit. The evaluation team can identify problems in specific areas and then assess how all the management and operating functions work together.

How Are the Results Used?

The results of a Comprehensive Diagnostic Evaluation provide both a short- and long-term program for resolving problems and developing changes to improve the utility's ability to be self-sustaining. To be effective, the improvement programs must be fully implemented and monitored. To accomplish this, the evaluation includes assigning responsibility for implementation to appropriate staff and establishing procedures for monitoring implementation and evaluating results.

Who Can Perform It?

It is often very useful for an independent evaluation team, whose members are not part of the ongoing operations and management of the utility, to perform the Comprehensive Diagnostic Evaluation. Team members should have:

- broad experience with many wastewater utility operations which can be drawn on during the evaluation;
- a broad range of skills required for the evaluation, including engineering, operations, maintenance, management, finance, accounting, and personnel.

Independent team members will provide a new, and often more objective evaluation because they are not part of ongoing management and operations. However, whether the team is made up of outsiders or facility personnel, it should include two or three experienced specialists. The evaluation may require a few days to several weeks, depending upon the size of the utility.

APPROACH TO PERFORMING A COMPREHENSIVE DIAGNOSTIC EVALUATION

The approach to performing a Comprehensive Diagnostic Evaluation is presented in Exhibit II-1. As shown, there are four phases:

Phase I. Preliminary Investigation - The team conducts preliminary investigation to obtain an initial understanding of how the utility is organized, how it operates, and how it performs as shown in its operating and financial statistics.

Phase II. Functional Evaluation - The team carries out detailed on site evaluation of each management, support and facility function of the wastewater utility.

Phase III. Overall Utility Evaluation - The team analyzes all functions to synthesize overall utility problems based on the specific problems within functions. This phase results in a utility-wide Evaluation Report.

Phase IV. Solution Development and Implementation Planning - The team formulates alternative solutions to the problems identified and then evaluates them in terms of cost, benefits, and practicality. The best solutions are selected and an implementation plan is developed.

The balance of this part of the chapter discusses the steps in each phase of the methodology.

Phase I - Preliminary Investigation

The preliminary investigation enables the team to develop an understanding of the utility's management and operations and to make a preliminary assessment of the problem areas. The investigation involves three steps in which team members should:

1. Make the initial contact with utility management and request background data.

2. Review background data to:

    - develop a basic understanding of the organization;

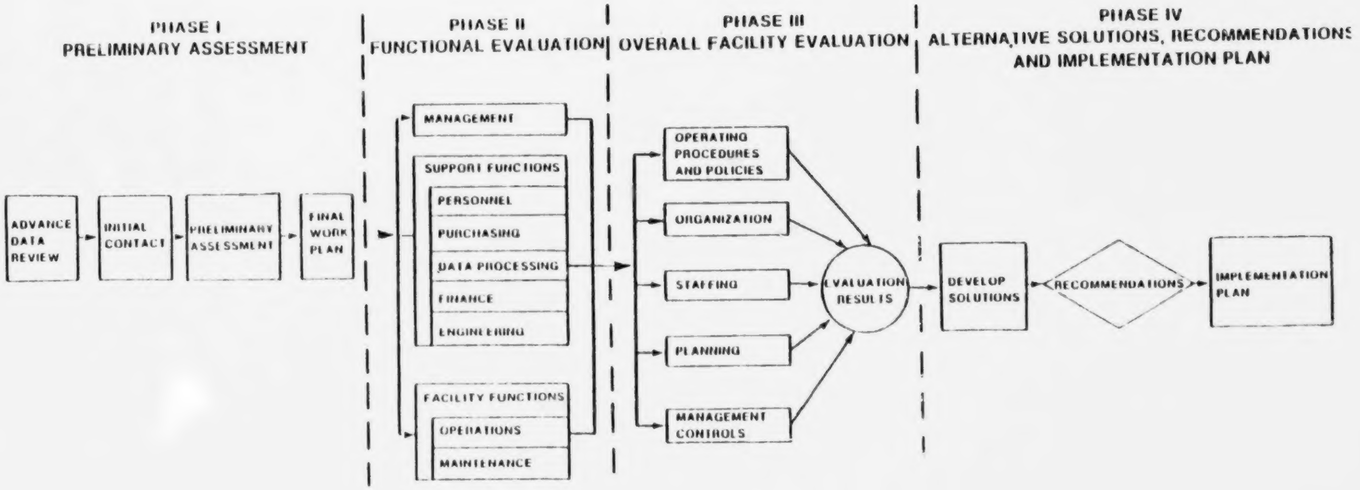
    - review compliance standards and compliance performance; and

    - identify each management function and review basic system data.

3. Identify major areas of concern and establish evaluation objectives and a work plan.

EXHIBIT I-1

COMPREHENSIVE DIAGNOSTIC EVALUATION OF WASTEWATER FACILITIES UTILITIES


PHASE I
PRELIMINARY ASSESSMENT
PHASE II
FUNCTIONAL EVALUATION
PHASE III
OVERALL FACILITY EVALUATION
PHASE IV
ALTERNATIVE SOLUTIONS, RECOMMENDATIONS
AND IMPLEMENTATION PLAN
ADVANCE DATA REVIEW
INITIAL CONTACT
PRELIMINARY ASSESSMENT
FINAL WORK PLAN
MANAGEMENT
SUPPORT FUNCTIONS
PERSONNEL
PURCHASING
DATA PROCESSING
FINANCE
ENGINEERING
FACILITY FUNCTIONS
OPERATIONS
MAINTENANCE
OPERATING PROCEDURES AND POLICIES
ORGANIZATION
STAFFING
PLANNING
MANAGEMENT CONTROLS
EVALUATION RESULTS
DEVELOP SOLUTIONS
RECOMMENDATIONS
IMPLEMENTATION PLAN

Step 1 - Make Initial Contact and Request Background Data

The Evaluation team requires some orientation before it conducts the on-site review. By preparing in advance, the evaluators gain a sense of the wastewater utility, its management systems, and how it operates. This step saves valuable time when the evaluators begin on-site work.

To perform this step, the evaluators should have an initial meeting or telephone conversation with the wastewater utility manager and the appropriate public officials. The objectives of the first contact are to learn the concerns and expectations of wastewater utility and local government officials, to review the evaluation approach, to schedule on-site interviews, and to obtain basic data.

By requesting and reviewing basic data in advance of the on-site review, many of the evaluators' initial questions will be answered and the subsequent Evaluation can be accomplished with a minimum of disruption to utility operations. The specific data that should be requested for advance review should include at least:

- any regulatory permits including NPDES.
- Sewer Use Ordinance (including Pretreatment Ordinance).
- plant operating reports and audit reports for the past 12 months.
- standard operating procedures.
- operation and maintenance manuals.
- utility bills and water bills for the past 12 months.
- organization chart (with names and titles).
- copies of any consultant reports conducted over the past 5 years including utility plans, energy reviews, etc.
- budgets and financial reports and audit reports for the past 5 years.
- management reports for the past 5 years.
- descriptions of:
    - user charge billing system(s);
    - accounting system(s); and
    - personnel system(s) and job descriptions.
- construction specifications and standards, including as-built drawings (plant, pump stations, and collection system).

Step 2 - Review Background Data

The treatment system's operating data should be compared to regulatory requirements and cost performance. Team members should assess how well the facility is meeting effluent standards and make an initial hypothesis about possible causes of noncompliance. Similar hypotheses should be made with respect to costs and management. These hypotheses provide needed insights for formulating major areas of concern and finalizing the evaluation work plan.

Step 3 - Identify Major Areas of Concern and Establish Evaluation Objectives and Work Plan

In Step 3, the evaluators should summarize what they believe to be the major areas of concern, preliminary hypotheses of problem areas, and a set of evaluation objectives. Using these results, they must develop a detailed work plan for the balance of the evaluation.

The utility manager and the appropriate local public officials must now meet with the team to review these materials and set out a final evaluation schedule. If more than one local government is involved, each should be represented at the meeting.

Phase II - Functional Evaluation

Phase II is the detailed on-site evaluation of each wastewater utility function including:

- management function:
- support functions:
  - personnel;
  - purchasing;
  - management information systems;
  - engineering; and
  - finance.
- wastewater facility functions:
  - operations; and
  - maintenance.

Management provides overall direction for the utility and bears the responsibility for the performance of all the functions. Support provides the specialized services needed to permit the management and control of the facility's operations. Facility functions carry out, under direction of management and with support from specialized services, the day-to-day running of the wastewater facility.

The diversity of functions and the complexity of a wastewater utility require that each function be evaluated in a systematic and consistent manner. The method presented here achieves this through use of a common set of evaluation topics. These topics provide the evaluators with a framework for evaluating each function. This enables the evaluators to develop the overall wastewater utility evaluation more efficiently.

The framework is illustrated in Exhibit I-2 which shows how the evaluation topics are applied to the maintenance function. Each of the other wastewater functions is evaluated in the same manner using the same evaluation topics. Because the impact of each of these topics is very difficult to quantify, evaluators must be able to call upon their own professional judgment and experience.

The common set of evaluation topics is briefly described below. These topics are further defined in each of the functional discussions in the last part of this chapter:

- Policies/Procedures - Does the function operate with a specific set of written or implicit policies and procedures, and are these consistent with the needs of the function and the wastewater utility as a whole?

- Organization - How is the function organized, and what are the lines of communication and authority? Are sound organizational practices followed, and does the organization meet the function's needs?

- Staffing - How is the function staffed? Is there an adequate number of personnel with the required skills to perform the work? Is there adequate training? Is there an adequate personnel system in place?

- Short- and Long-Term Planning - Is there an operating plan for the function which includes budgets, staffing, capital improvements, emergency procedures, and so forth? Are plans followed, and are they adequate to meet the needs of the function and the utility? Is consideration given to external planning as well as internal planning?

- Management Controls - Are there management controls in place to monitor performance and allow actions to be taken to solve problems? Are the correct recordkeeping systems in place, and are there procedures to use the records and reports as management tools?

Each of these topics is used when evaluating each utility function. The principal output of the functional evaluation is a report summarizing the team's findings on each individual function.

EXHIBIT I-2

MAINTENANCE EVALUATION MATRIX

EVALUATION TOPICS	MAINTENANCE SUBFUNCTIONS				
	PROCESS EQUIPMENT	WASTEWATER COLLECTION SYSTEM	VEHICLES	GROUNDS AND BUILDING	FUNCTIONAL EVALUATION BY TOPIC
POLICIES/PROCEDURES					
ORGANIZATION					
STAFFING					
PLANNING					
MANAGEMENT CONTROLS					
SUBFUNCTION REPORTS					OVERALL SUBFUNCTION REPORT

Phase III - Overall Utility Evaluation

The overall objective of the Comprehensive Diagnostic Evaluation is to identify the principal factors that contribute to non-compliance and/or excessive operating costs. In Phase II, each major utility function is evaluated in detail and conclusions are drawn about problems in each functional area. Phase III is concerned with putting together the results of the individual functional analyses and drawing conclusions about the utility as a whole. The problems identified are then ranked according to the severity of their impact on compliance and costs.

There are three steps to developing the overall evaluation:

1. Summarize all the functional evaluations and develop conclusions for each evaluation topic for the utility as a whole.
2. Rank functional evaluation topic results in terms of impact on compliance and cost.
3. Develop the overall evaluation report that summarizes the major problems in order of the severity of their impact.

Following is a brief discussion of each step.

Step 1: Summarize Functional Evaluations

This part of the analysis focuses upon assimilating the problems identified and assessing the extent to which these problems affect plant performance and utility cost.

To assimilate performance problems across functions, it is suggested that the evaluators construct a utility-wide matrix (functions vs evaluation topics) and fill in the cells with:

- a description of the specific problems; and
- an assessment of their impact on compliance and cost.

Exhibit I-3 is an example of how part of the utility-wide evaluation matrix would be filled out. Developing the matrix serves two purposes: (1) it concisely summarizes the performance of the utility as a whole and (2) it provides a worksheet format to assess the evaluation topics across each function for the utility as a whole. This assessment must be based upon a consistent set of evaluation measures as follows:

- The problem has no significant effect on performance.
- The problem has a minor detrimental effect on compliance, cost-effectiveness, or both. While improvement is desirable, correction would not substantially improve performance.

EXHIBIT I-3

UTILITY-WIDE EVALUATION MATRIX

	CRITERIA					
FUNCTION	POLICIES & PROCEDURES (1)	ORGANIZATION (2)	STAFFING (3)	PLANNING (4)	MANAGEMENT CONTROLS (5)	FUNCTION SUMMARY (6) COMPLIANCE/COST IMPACT
MANAGEMENT Organization Controls Planning Public Relations Professional Services			No clean assignment of responsibility - no personnel procedures. No overall assessment of utility staffing needs. Impacts ability of all operating groups to function because of staff problems.			######################## FROM SECOND STEP ######################## Function Evaluation
SUPPORT SERVICES Personnel Purchasing Data Processing			Appears to be approximately staffed and organized but function performed by City Dept. of Public Works No utility impact.			######################## FROM SECOND STEP ######################## Function Evaluation
Financial			Understaffed but skilled personnel Impact is late billing reporting, cash flow lag and insufficient cost data for future budgets/notes.			######################## FROM SECOND STEP ######################## Function Evaluation
Engineering			No in-house engineer staff, function performed by consultants; results inconsistent and inadequate Poor engineering judgement, no process control, poor equipment selection. Results in excessive costs.			######################## FROM SECOND STEP ######################## Function Evaluation
OPERATIONS WWT Sludge Util. Prod. Labs Conveyance			Understaffed. Adequately staffed and managed but is inadequately supported by maintenance and engineering. Results in having to improvise without adequate data and equipment. Can't meet standards.			######################## FROM SECOND STEP ######################## Function Evaluation
MAINTENANCE Scheduling Process Equipment Vehicles Grounds & Buildings Conveyance	No clear operating policies. compliance/cost impact	No written operating procedures; job order system not used. Impact preventative maintenance system and contributes to excessive equipment failure.	Understaffed. Does not have qualified mechanical skills needed; department not organizationally structured Results in excessive EQ failure and then non-compliance	Lack of planning results in only emergency maintenance - no preventive maintenance. Contributes to excessive equipment failure; contributes to early equipment replacement.	No records prevents equipment data for preventive maintenance system. Contributes to equipment failure.	Lack of strong management controls; and excessive staffing problems results in only minimal maintenance. Major reason plant is often non-operating. Out of compliance and results in extra cost to fix.
CRITERIA SUMMARY	(Summarize based on above.)	(Summarize based on above.)	Staffing problems result from overall utility organization and personnel program deficiencies - results in wide variation in level and quality of staff by function Major impact to compliance/cost.			Summarize based upon both function summary (Rowends) and criteria summary (column ends).

- The problem periodically affects the utility's capability to maintain compliance standards and/or results in additional but avoidable costs. Correction will improve performance but will not necessarily solve major compliance problems nor substantially reduce cost.

- The problem directly and consistently affects the utility's ability to achieve compliance and/or results in excessive operation costs.

Continuing with the example in Exhibit I-3, the evaluators can fill in the matrix, row by row, using the functional evaluations developed in Phase II. This is illustrated in the row for the maintenance function. In the example, the maintenance problems focus on lack of management controls and serious staffing problems in both number and skill level.

The process of filling in each row using the team's functional evaluation results will complete each row in the matrix except the bottom one. This row is a conclusion for each evaluation topic for the utility as a whole. It is completed by reading down the column for a particular evaluation topic to see how each function performs with respect to that management criterion.

In the example, staffing is the evaluation topic presented. Reviewing the sample column shows the evaluator that staffing is not only a problem in the maintenance function but also in the financial management, engineering and operation functions. The evaluator can also see that the problem appears to be a result of the overall wastewater utility management and personnel procedures rather than management at the functional level. This example illustrates how the assessment moves from the basic functional evaluations to the overall evaluation.

Step 2: Rank Both Functional and Evaluation Topic Results

The evaluators use the utility-wide matrix results to rank the problems in order of impact severity. In Exhibit I-4, the results of the matrix are cross-classified, and the critical problem areas are isolated by evaluation topic and by function. These problem areas are then ranked in order of impact. Again, the ranking procedure requires professional judgment on the part of the evaluators.

The example in this exhibit shows that staffing (topic 3) appears in almost every function and the judgement of the evaluators suggests this is the most significant overall problem. As a result, this problem is ranked #1 under the problem ranking column. The balance of this column is developed in a similar manner and results in a ranking of problems by evaluation topic.

A review of the matrix, by function, shows that maintenance and engineering have the most numerous and most severe problems. From the qualitative evaluation however, management appears to be the origin of some of these problems. Since all the maintenance and engineering problems cannot be solved without first correcting management problems, general management is the problem area assigned the highest ranking, followed by maintenance and engineering.

EXHIBIT I-4

CROSS SUMMARY AND RANK ORDER OF WASTE WATER FACILITY PROBLEMS[1]

MANAGEMENT TOPIC	FUNCTIONS								IMPACT ON FACILITY (Judgement)	PROBLEM BY TOPIC: RANK MOST IMPACT TO LEAST IMPACT (Rows)	PROBLEM AREA BY FUNCTIONS MOST PROBLEMS/IMPACT TO LEAST PROBLEMS/IMPACT
	MANAGEMENT	FINANCE	ENGINEERING	PERSONNEL	PURCHASING	MANAGEMENT INFORMATION SYSTEMS	OPERATIONS	MAINTENANCE			
1. Policies and Procedures								X	MINOR	1. Staffing in All Functions	1. Management
2. Organization	X		X					X	MINOR	2. Management Controls In Most Functions	2. Maintenance
3. Staffing	X	X	X	X	X	X	X	X	MAJOR		3. Engineering
4. Planning			X					X	MINOR		4. Operations
5. Management Controls	X		X	X	X	X	X	X	MAJOR		5. Personnel
Impact on Facility	MAJOR	MINOR	MAJOR	MAJOR	MINOR	MINOR	MAJOR	MAJOR			

---

[1] Evaluation is based on professional judgment of evaluators and should not be numerically tabulated to rank problem areas.

Step 3: Summarize Results in Evaluation Report

To summarize the results of the analysis a report should be prepared that presents a brief overview of the results and the conclusions. The balance of the report should address in detail, and according to rank, each problem by topic and function. The evaluators should review the finished report with the utility's management in a working session before moving to Phase IV.

Phase IV - Solution Development, and Implementation Planning

The fourth phase in the Comprehensive Diagnostic Evaluation is the development and implementation of solutions to the problems identified in the first three phases. It is only with positive action that improved compliance and cost performance can be achieved.

To develop an implementation program, local officials and wastewater utility managers must understand and agree on the seriousness of the problems identified. In addition, both the local officials and utility managers must be involved as solutions are developed, if practical solutions are to be carried out.

The basic steps to develop solutions, recommendations, and an implementation plan are as follows:

1. Develop alternative solutions to each problem identified; identify advantages and disadvantages (costs and benefits) for each solution and identify constraints to their implementation.

2. Review and discuss each possible solution with local officials and utility managers and obtain a consensus for the most practical and effective solution to each problem.

3. Prepare both short- and long-term implementation programs that include such items as funding, staging, assignment of responsibility, and specific action steps to be taken.

Step 1: Develop Alternative Solutions

The evaluators should develop a set of alternative solutions for each problem area. Solutions should be arranged in terms of their ability to be implemented. Solutions such as simple and immediate management actions which can alleviate serious problems should be considered first. For example, if problems stem from employee scheduling or understaffing, administrative actions can be taken to revise schedules and/or increase the operations staff (assuming such additions can be made within existing financial resources). These solutions should lead to a set of immediate action steps.

More comprehensive solutions, which require time to implement, should also be formulated. These solutions may be short-term (over the next year) or long-term (1 to 5 years). Solutions that fall into these categories include such things as rate changes (short-term) or new/revised accounting and budgeting systems (long-term).

Whether the solutions are changes in operating procedures, management systems, or organization, each must be accompanied by a listing of its advantages and disadvantages. This is most important since this information will assist local officials and wastewater utility managers in selecting solutions for implementation.

Step 2: Review Alternative Solutions With Local Officials and Utility Managers

Alternative solutions should be reviewed with local officials and the wastewater utility management to:

- explain the results of the analysis and the advantages and disadvantages of the alternatives;
- identify political, legal, or financial constraints that may affect implementation; and
- reach agreement on solutions from those responsible for carrying them out.

Step 3: Prepare a Short- and Long-Term Implementation Program

The final step in the Evaluation is to develop specific short-term and long-term actions that can be used as an implementation guide by the local officials and utility management. The implementation guide should include, at a minimum:

- identification of the individuals responsible for implementation;
- a timetable showing immediate, short-term, and long-term actions;
- the cost of implementing each recommendation and the source of funds to pay for implementation;
- the specific steps and/or actions which must be taken and the specific individuals or departments responsible for each step; and
- provisions for ongoing performance evaluation.

HOW TO EXAMINE UTILITY FUNCTIONS

In developing the Comprehensive Diagnostic Evaluation methodology, the functions of a wastewater utility are grouped into three categories as shown in Exhibit I-5. These categories are:

1. Management Functions

2. Support Functions

   - financial management
   - engineering
   - personnel
   - purchasing
   - management information systems

3. Wastewater Facility Functions

   - operations
   - maintenance

For purposes of discussion, it is assumed that wastewater collection and treatment are organized as a separate utility that controls each function, under the guidance and direction of the local government. In many cases, however, this is not the case. Collection and treatment may not be controlled by one utility manager and the supporting services may be independent of the wastewater facility. This results in additional layers of management that must be evaluated.

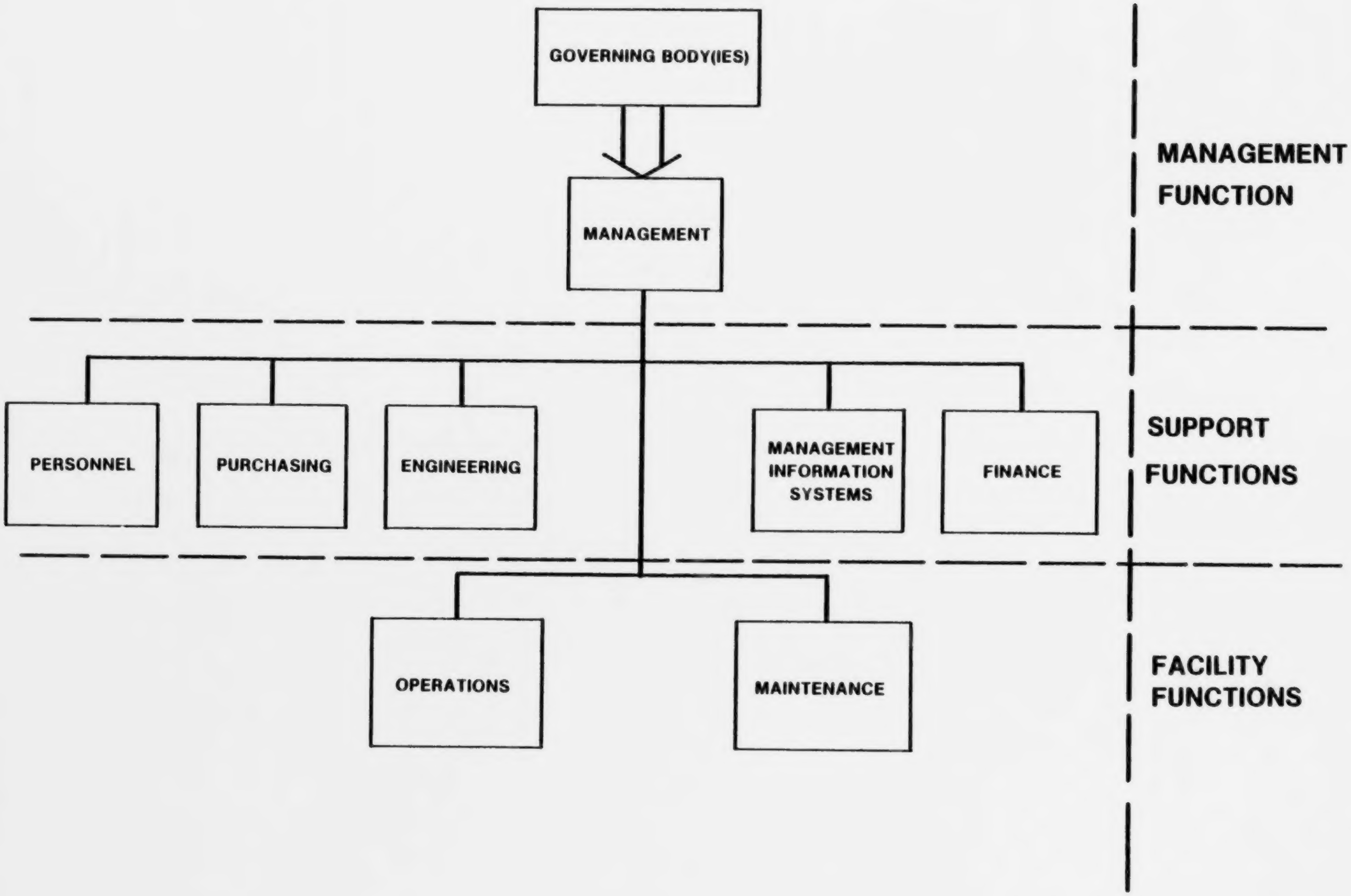
In this part of Chapter I, each of the functions is reviewed including a discussion of its general characteristics and an identification of key problem areas that should be considered in the review. For each function there is an exhibit summarizing the types of questions that need to be answered and analyzed for each of the evaluation topics discussed in the approach to performing a Comprehensive Diagnostic Evaluation. These exhibits are not intended to replace detailed interview guides and evaluation checklists but rather to identify, for the utility manager, the type of concerns and issues that need to be considered in the review. This will allow the utility to better monitor and evaluate the evaluation team and its findings.

Management Function

A thorough review of the management function is required to establish a framework within which the utility operates and to evaluate the extent to which management affects the performance of the utility. Misdirection at the

EXHIBIT I-5

WASTEWATER UTILITY ORGANIZATION
(ILLUSTRATIVE)


GOVERNING BODY(IES)
MANAGEMENT
MANAGEMENT FUNCTION
PERSONNEL
PURCHASING
ENGINEERING
MANAGEMENT INFORMATION SYSTEMS
FINANCE
SUPPORT FUNCTIONS
OPERATIONS
MAINTENANCE
FACILITY FUNCTIONS

management level can result in performance problems that are often attributed to the treatment functions. As wastewater facilities have grown in size and complexity, management problems as well as technical problems have increased. Managing people and the treatment process requires planning, organization and direction.

Especially important among the five evaluation topics are:

- policies and procedures;
    - all interaction with the governing body
    - articulating goals, policies and procedures for the utility
    - public relations
- organization;
- staffing;
    - training practices
- planning; and
- management controls;
    - short range
    - long range
    - budget preparation and justification
    - controlling utility performance

Management has the primary responsibility to interact with the governing body(ies) keeping it fully informed of all major aspects of the facility and translating the governing body's direction into the policies and procedures which direct the facility. In addition, management has the responsibility to deal with state and Federal regulatory agencies to ensure that compliance is achieved.

Management must develop and provide the overall organization with operating goals, objectives, policies and procedures to ensure that each function in the utility is operating consistently with the overall needs of the utility. In addition, it must ensure that each function's procedures interact with each other function.

One of the most overlooked management responsibilities is public relations. If utility management maintains good communication with the public and is aware of the public's needs, costly delays can be avoided when major programs are developed and/or changes in financial or operating policies are required.

Since management is responsible for the overall organization of the utility, it must ensure that the utility is organized in the best possible way to accomplish the utility's mission. In developing the organizational structure careful attention must be given to assignment of responsibility, assignment of authority to carry out the responsibility and to the lines of authority. A major problem occurs if the formal organization and lines of authority are undermined and made ineffective by informal lines of authority, as shown in Exhibit I-6.

Staffing levels and training requirements are developed and set by management. Establishing staffing levels requires management to evaluate finances, operating needs, and other needs before determining the mix of skills and experience needed. The effectiveness of the utility depends on the ability of management not to understaff (unable to perform all functions) or overstaff (inefficient and costly).

The level of training of new and experienced personnel is established by management. Management must recognize the training needs for all personnel and ensure that such training is available.

Planning and Budgeting

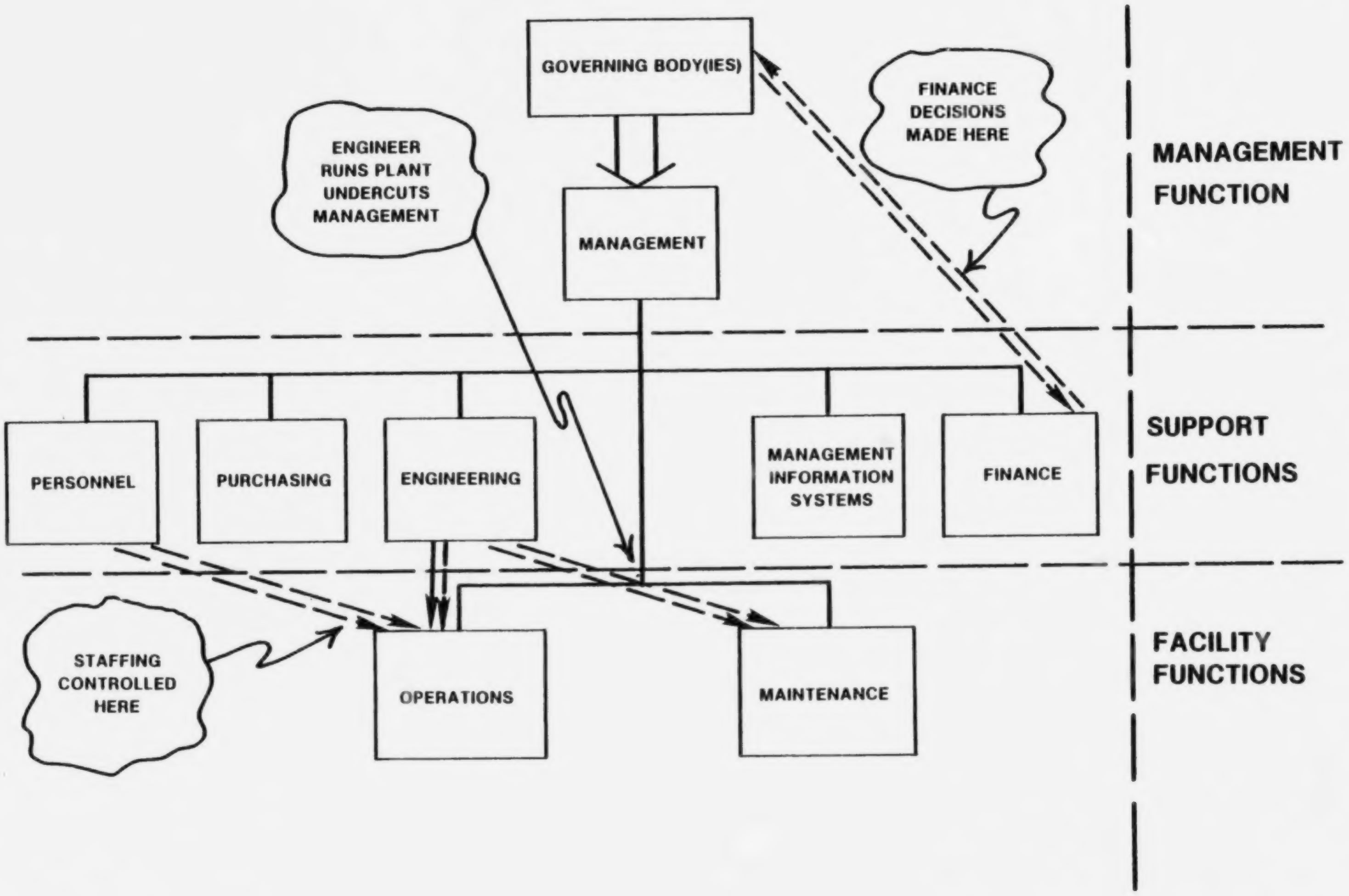
Only management has all the information about each utility function as well as the information and requirements provided by the governing bodies and the regulatory agencies. This information should be used to anticipate and provide plans and decisions for future facility needs. Without such planning there is little chance for the utility to meet all community needs. The following is a list of the needs which must be planned:

- capacity requirements;
- future standards;
- equipment replacement;
- reconstruction needs;
- emergencies;
- financing; and
- other.

A critical component of management planning is short- and long-term budget preparation, justification and control. This activity controls the ability of the utility to be self-sustaining and to operate at the correct level of efficiency. Of major importance in formulating a budget is management's ability to forecast revenue needs and take steps to ensure that adequate revenues will be generated to cover operation, maintenance and equipment replacement and reconstruction needs.

EXHIBIT I-6

WASTEWATER UTILITY ORGANIZATION
(ILLUSTRATIVE)


GOVERNING BODY(IES)
FINANCE DECISIONS MADE HERE
ENGINEER RUNS PLANT UNDERCUTS MANAGEMENT
MANAGEMENT
MANAGEMENT FUNCTION
PERSONNEL
PURCHASING
ENGINEERING
MANAGEMENT INFORMATION SYSTEMS
FINANCE
SUPPORT FUNCTIONS
STAFFING CONTROLLED HERE
OPERATIONS
MAINTENANCE
FACILITY FUNCTIONS

Monitoring and Control

Management must constantly monitor and evaluate each function in the utility and take necessary actions to maintain their level of performance. Actions include such things as replacement of personnel, changes in user charges, reorganization, and revision of operating procedures. Adequate information must be available and a set of management controls must be in place. Such controls include management information systems that produce reports to allow continuous evaluation of performance based upon both quantitative data (budget variance and effluent samples) and qualitative data (staff morale). The control systems should have specific procedures to be followed when actions have to be taken to maintain performance levels.

Exhibit I-7 presents a series of questions, arranged by evaluation topic, identifying key issues and concerns in utility management.

Exhibit I-7

MANAGEMENT FUNCTION EVALUATION QUESTIONS

PROCEDURES AND POLICIES

- Is wastewater collection and treatment run as a utility?
- Does the utility have a set of formal or informal management policies?
- Do policies address?
    - remaining in compliance
    - minimizing cost
    - public relations
    - complying with legal requirements
- Does a set of procedures exist to implement these policies?
- Are they written or informal?
- Do the procedures consider?
    - acceptance of wastes
    - service agreements
    - staffing
    - training
    - staff meetings
    - support services
    - line functions
    - emergencies
    - safety
    - labor relations
    - energy conservation
    - long and short range planning
    - staff reporting requirements
    - budgeting
    - use of professional services
    - recordkeeping practices
    - housekeeping practices
    - attention to complaints
    - guided tours
- Are the policies and procedures followed in fact?

ORGANIZATION

- What is the history of the utility?
- Is the institutional structure of the utility adequate?

Exhibit I-7 (Con't)

- Is there an Organization Plan (Chart) for the entire utility?

- Does the plan include

  - who serves as the governing body
  - who serves as the regulatory body
  - powers of the utility to
    - raise revenue
    - raise capital
    - undertake planning, design and construction
    - set operating budgets
    - accept and control waste
  - lines of authority
  - reporting requirements
  - broad job descriptions
  - staff responsibilities and backup
  - interdepartmental relationships
  - emergencies?

- Is the plan consistent with procedures and policies?

- Is the Organization Plan formal or informal?

- Is the plan available and understood by the staff?

- Is the plan followed in fact?

- How well does the management Organization Plan match with the individual functional Organization Plans within the utility?

STAFFING

- Is there adequate staff (skills and numbers) to meet the organizational needs of the utility?

- How does staff use compare to similar utilities?

- Is the staff effectively utilized?

- Is utilization controlled by

  - evaluation of need for new hires
  - elimination of unnecessary work
  - determination of degree of shift coverage
  - time card/work order system
  - scheduling?

Exhibit I-7 (Con't)

- Does management work closely with personnel to provide direction?

- Is training encouraged across the utility? Certification?

- Are good working relations enhanced by

  - evaluation of performance
  - open lines of communication
  - a good working environment
  - opportunities for advancement
  - competitive salaries?

- Does management encourage staff motivation?

- Does management support the first line supervisors?

- When do consultants or other outside personnel supplement the staff? How is their use evaluated and controlled?

PLANNING

- Does management oversee and coordinate all utility planning efforts? To what extent does the governing body become involved?

- To what extent does management ensure that budget preparation by the finance department is

  - actually prepared
  - a realistic representation of anticipated expenditures
  - understood and accepted by the governing body
  - utilized by staff through delegated cost responsibility ?

- Does management provide broad scheduling input to staff with scheduling responsibilities? Is feedback directed to management?

- Are the following scheduled and reported upon?

  - work activities
  - staffing
  - use of supporting services
  - use of supplies
  - energy use
  - construction
  - funds

Exhibit I-7 (Con't)

- Does a utility-wide emergency contingency plan exist? Is it known and accepted across the utility?

- Is the plan reviewed and updated periodically?

- Does the plan contain

    - an analysis of vulnerable areas
    - standby power sources
    - backup assignments in key positions
    - alternate operating plans
    - training routines?

- Have insurance needs been determined and met?

- Does insurance coverage include

    - public liability
    - boiler room
    - structures
    - flood damage?

- Have long-range staffing needs and objectives been determined? Formally?

- Are long-range budgets estimated for operation, maintenance, and equipment replacement? Are they used in current year budget preparation?

- Does a formal capital improvement program exist for the utility? Does management keep the governing body abreast of it?

- Does management coordinate the development and review of the capital improvement program with the assistance of finance and engineering?

MANAGEMENT CONTROLS

- Does management receive and utilize summary reports on planned and actual daily activities within the utility?

- Do these reports provide useful information?

- Is too much/little information requested by management?

Exhibit I-7 (Con't)

- Do reporting requirements hinder the staff's effectiveness beyond reason?

- Do reports to management summarize

  - treatment efficiency
    - influent
    - process parameters
    - effluent
    - sludge characteristics
  - downtime
  - accidents
  - staff turnover
  - energy use
  - cost records
    - budget
    - actual expense
  - revenue generation?

- How does management utilize the reports it receives?

- Are all regulatory reporting requirements satisfied?

Support Functions

Support functions include those ancillary activities that are needed to enable the line functions to carry out the day-to-day operation of the utility. Evaluation of each support function must focus on the service provided, and the extent to which it meets the needs of the management and treatment functions.

The following support functions need to be considered:

- financial management;
- engineering;
- personnel;
- purchasing; and
- management information systems.

Financial Management

Proper financial management is important to utility managers because it provides them with the ability to maintain fiscal control, meet citizen desires for higher quality services, and increase efficiency and accountability.

Financial management services may be provided by the utility itself, the department of public works or the general municipal government.

Key financial management activities include accounting and financial reporting, financial planning and budgeting, and cost recovery.

Accounting and financial reporting are important to utility managers for two major reasons. First, they provide utility managers with a degree of confidence that the utility's resources are being properly used. Second, they provide managers with the information needed to evaluate performance and determine a course for future action.

In recent years, the costs of facility operations have increased dramatically. There have also been growing constraints on the revenue sources to pay for facility operations. These operations are being closely scrutinized to assure that all services are being planned and provided within acceptable levels of cost. Planning and budgeting are the only means by which the facility can accumulate financial data, analyze service costs and make decisions about the level and cost of services which will be provided. The budget is the main vehicle for monitoring and controlling the facility's expenditures and may be used to monitor the quality of the work performed. Planning and budgeting cover both operating and capital programs. These serve as financial guidelines for the allocation of resources to accomplish planned activities.

Cost recovery refers to the mechanism the utility uses to raise revenues to achieve financial self-sufficiency. Frequently total cost recovery is not being achieved by wastewater utilities. The types of cost that need to be considered include:

- operating and maintenance;
- indirect;
- equipment replacement and reconstruction; and
- debt service.

The basic questions that need to be addressed and evaluated during the review of the financial management function are presented in Exhibit I.8.

Exhibit I-8

FINANCIAL MANAGEMENT FUNCTION EVALUATION QUESTIONS

PROCEDURES AND POLICIES

- Are there policies or procedures that address
  - recovery of total utility cost
  - long and short term planning
  - maintaining a self-sustaining operation
  - cost efficiency?
- Is there a set of standard procedures to implement these policies?
- Are they written or informal?
- Do the procedures consider
  - a sewer service charge system
  - enterprise fund accounting
  - capital budgeting
  - use of line item or activity item budget
  - flexible budgets
  - internal controls over expenditures
  - financial reporting
  - formal chart of accounts
  - fixed asset records
  - accounts payable
  - accounts receivable
  - source documents
  - encumbrance system?
- Does the sewer service charge system recover total system costs both direct and indirect?
- If it does not recover total system costs:
  - are total system costs known?
  - are total operation, maintenance and equipment replacement costs known?
  - are indirect costs known?
  - does it recover depreciation?
  - does municipal policy require tax subsidies of sewer service charges?
  - does it rely heavily on non-user fee revenue?
- Are sewer service charge revenues utilized to subsidize the general fund?

Exhibit I-8 (Con't)

- Does the user charge system treat all users proportionately? Does it ensure that
  - all users are being charged
  - industrial user fees are based on total wastewater discharge, not just flow
  - residential user charges are in place
  - user flow data is current
  - industrial discharge data is available and utilized
  - user fees are reviewed periodically
  - user charge system is based on actual use?
- Does the municipality's assessment authority limit the effectiveness of its sewer service charge system?
- Is there a timely billing system?
- Is there a formal follow-up billing procedure for delinquent accounts?
- Are outstanding purchase orders encumbered?
- Are end-of-year encumbrances reviewed for proper accruals?
- Does the department reconcile outstanding purchase orders?

ORGANIZATION

- Does the utility have primary responsible for its own financial management activities?
- What is the organizational plan (chart) for financial management within the utility?
- If the financial management functions are not within the direct control and responsibility of the utility, where is the control for these activities based?
- If the functions are performed by other departments within a municipality, is there a direct line of authority in reporting between the utility and the other departments?
- Are these lines of authority and responsibility clearly defined and understood?
- Are the lines of authority and responsibility followed in fact?
- Are accounting duties segregated?
- Are local capital costs and operation, maintenance and replacement cost separately identified?

Exhibit I-8 (Con't)

STAFFING

- Is there an adequate number of staff to achieve the policies and procedures?
- Are staff adequately qualified for their duties and responsibilities?
    - certification (CPA's)
    - qualifications
    - abilities
    - job performance
    - understanding of financial management procedures
- Is staff effectively utilized?
- Are employees who handle cash bonded?
- Does the management encourage staff motivation?
- Is staff motivation maintained by
    - encouragement for training
    - job recognition
    - promotional opportunities
    - salary incentives
    - job security
    - working environment?

PLANNING

- Is there a formal planning process?
- Are there identified planning responsibilities and authority?
- Is there a current five-year capital improvements and replacement program?
- Is there an effective budgeting process? Does the budgeting process consider items such as
    - inflation
    - contingency funds
    - capital replacements
    - reserves
    - flow and strength characteristics (flexible budgets)?
- Who is involved in the budget development and review process?

Exhibit I-8 (Con't)

- Are future year budget impacts integrated into the current year budget process?
- Is there a long-range capital improvements program?
- Are there adequate reconstruction reserves for the plant facility?
- Are annual capital budgets typically reduced or eliminated prior to budget approval?
- Do the budgeting and accounting systems provide relevant data to make budget-cutting decisions?

MANAGEMENT CONTROLS

- Are the following management systems kept current
    - an appropriation and/or encumbrance system
    - cash reports
    - monthly operating reports
    - monthly budget-to-actual reports?
- Are monthly operating reports reconciled to the general ledger?
- Are there effective cash controls?
- Is there an appropriation or budget authorization control system?
- Is there a system for checking availability of funds?
- Is there a system to control amounts outstanding on purchase orders issued but not received?
- Are formal budget-to-actual reports maintained?
- Is there a budget-to-actual report for revenues? Is the budget to actual revenue report based on billings or cash received?

Engineering

Wastewater utilities require engineering services to provide evaluation and direction of facility operations and maintenance. Engineering services may be part of the utility staff, or provided by the municipal department of public works. In many cases, engineering services also require outside assistance from consultants.

Within the evaluation topics, management controls and planning are of particular concern when evaluating the engineering function:

- management controls
  - operating the facility (e.g., process control);
  - maintaining the facility (e.g., collection system);
- planning
  - short-term planning (e.g., schedules, emergencies, resource allocation);
  - long-term planning (e.g., process changes, Capital Improvement Program);
  - design review; and
  - construction management and inspection.

Facility operations, both collection and treatment, can be controlled and improved if there is engineering staff with sanitary design and process control expertise. These skills are not always available within engineering departments and the required operational assistance may come from engineering consultants.

Facility maintenance may require engineering services, particularly construction engineers in collection system maintenance. The engineering function also usually has responsibility to design and implement collection systems improvement.

Construction management and inspection is a significant activity of the engineering function to ensure that the utility fully controls and receives quality capital construction.

Short-term engineering planning includes technical assistance to the other utility functions in:

- scheduling daily operations and maintenance;
- evaluating emergency procedures; and
- allocation of resources.

Long-term engineering planning focuses on capital improvement including facility planning, design and review.

Exhibit I-9 presents the evaluation questions that should be addressed when evaluating the engineering function.

Exhibit I-9

ENGINEERING FUNCTION EVALUATION QUESTIONS

PROCEDURES AND POLICIES

- Are policies in place which differentiate between the use of internal and external engineering services?
- Is the engineering department responsible for long range technical planning?
- Is is responsible for maintaining a capital improvements program? Is the program coordinated through management?
- What policies have been established for using the engineering staff on operational problems?
- When must outside assistance be sought?

ORGANIZATION

- Does the engineering function have an Organization Plan?
- Does the plan identify staff responsibilities (job descriptions) and lines of authority?
- Is it evident that the plan is current and reflects daily practices?
- How is time split between the wastewater utility (operations and maintenance) and other tasks (i.e., street work)?
- Are priorities established for work precedence? Does this create problems?
- Does the utility management have direct access to engineering expertise when it is needed?

STAFFING

- Does the staff meet basic organizational needs (job descriptions)?
- Is the staff effectively utilized?
- When outside assistance is sought does the engineering staff really need support?

Exhibit I-9 (Con't)

- Does the staff often become overloaded?
- How well does the engineering staff work with hired consultants?
- Does management work with the engineering staff when seeking consulting assistance?

PLANNING

- Are the engineers involved in the budgeting of the use of resources?
- Do they assist in the scheduling of daily operations and maintenance?
- Are they part of updating emergency procedures on an ongoing basis?
- How are upcoming engineering needs scheduled?
- Is the level of engineering involvement in utility operations reviewed periodically?
- How are construction activities anticipated and integrated into existing workloads?

MANAGEMENT CONTROLS

- Are the decisions and recommendations of the engineering staff accurately documented?
- Does the documentation include?
    - supporting information
    - engineering analysis
    - design calculations
    - cost/benefit studies of alternative actions
    - management and staff input
- Is documentation readily accessible by process and project?
- Is documentation also readily accessible for the work of engineering consultants?
- Do the engineering records complement the "physical facilities" records?

Exhibit I-9 (Con't)

- What utility records are directly under the control of the engineering staff?
- How are the costs of engineering support allocated back to the other utility functions?
- How are these costs budgeted for and expenses tracked?
- Does the engineering staff receive periodic operating and maintenance reports to keep abreast of the facility? Are these reports useful?

Personnel

The activities of the personnel department are central to acquiring and maintaining a top level utility staff. Particularly important in the review is the evaluation of the policies and procedures for:

- hiring;
- employee communications;
- personnel records;
- salary and benefit structure; and
- collective bargaining and contract administration.

The availability and performance of these services can affect the level and quality of performance of staff throughout the utility.

While staffing needs are usually determined by utility management, the actual hiring process is controlled and coordinated by the personnel department. This process includes soliciting applicants, screening applications, testing, interviewing, and consulting on the final hiring decision.

Being the principal employee information center, the personnel department must provide effective communications. This includes preparing and updating an employee manual, discussing and administering policies and benefits, maintaining current personnel records, and controlling performance evaluations.

Personnel records should provide a complete history of each staff member from hiring to termination. These records should include:

- the application form;
- job descriptions
- interview notes;
- insurance and tax forms;
- performance evaluations;
- salary history;
- sick leave and vacation history;
- training/certification; and
- notes from an exit interview given at employment termination.

These records should be viable and current to assist employees and management.

Salary and benefits for employees must be competitive to attract and retain qualified people. The personnel department should periodically review and compare salary structures and benefits to the local job market and to similar wastewater utilities. In this way, employee compensation can be evaluated for reasonableness. Restructuring salaries and benefits should be a utility-wide effort coordinated by the personnel department.

The staff of many utilities are union organized. It is the personnel department's job to work with management in collective bargaining and contract administration with union employees. This requires working with the shop stewards and union officials to reach mutually acceptable contracts. It is also the personnel department's function to ensure the utility operates within the contract requirements.

The practical application of good labor relations is an extensive job requiring detailed guidance. Detailed assistance can be found in "Union Management Relations in Public Service," Morrison et. al., WPCF Journal, Page 7, 1968.

Exhibit I-10 presents the specific personnel evaluation questions for the personnel function.

Exhibit I-10

PERSONNEL FUNCTION EVALUATION QUESTIONS

PROCEDURES AND POLICIES

- Does the personnel function have a clear set of procedures and policies which are known to all supervisors?
- Are policies set with respect to
    - preparation of job descriptions
    - recruiting and termination practices
    - position processing
    - salary
    - evaluation and development
    - benefits
    - affirmative action/EEO
    - occupational safety and health
    - labor relations
    - desirability of certification or other professional recognition
- Are procedures available to all employees and are they understandable?
- Do supervisors appropriately apply personnel procedures and policies?
- What are the local, state, and federal legal requirements governing personnel policies and practices?
- How is compliance with these requirements ensured?
- Is the utility currently in compliance?

ORGANIZATION

- Does a current Organization Chart exist for personnel?
- Is its supporting role to the other utility functions clearly defined?
- Are the requirements and responsibilities of personnel staff detailed (job descriptions)?
- Does a procedural manual exist? Is it utilized?
- Are reporting relationships clearly defined?

Exhibit I-10 (Con't)

STAFFING

- Does the personnel staff meet the organizational needs (job descriptions) of the utility?
- Are the personnel staff effectively utilized? Does the personnel staff receive training?
- Does their work complement all other functions?
- How is their attitude and motivation towards their work?

PLANNING

- How does the utility determine its staff requirements?
- How are salary adjustments processed?
- Are job descriptions reviewed and updated periodically?
- Do personnel policies undergo formal review with utility management?
- To what extent are the supervisors of other utility functions part of the planning process?
- What management controls are used in planning?

MANAGEMENT CONTROLS

- Are the organizational plans of all utility functions consolidated into an overall plan?
- Is a complete set of job descriptions maintained?
- Is an employee file maintained?
- Is a file of rejected applicants kept?
- Does the personnel staff perform exit interviews and retain the results?
- Are files useable?
- Do job descriptions include?

Exhibit I-10 (Con't)

  - position title
  - duties of the position
  - who the individuals report to
  - required qualifications
  - promotional potential

- Are job descriptions updated on a routine basis?

Purchasing

Purchases of wastewater utility supplies and equipment are usually coordinated through a purchasing department. This requires clear lines of communication and an effective purchase order system.

Purchasing provides a service to the other utility function that requires continual interaction and communication to place an order for the right item, monitor the processing of the order, ascertain the quality of the product received, and monitor the performance of the vendors used by the utility. The purchase order system can be the basis for this communication provided that it contains pertinent information and is utilized by the staff. An important consideration with the use of purchase orders is whether the majority of purchases flow through this process. If the utility staff tends to avoid the purchasing department route, then the system is not working.

Within the evaluation topics, policies and procedures and management controls are particularly important when evaluating the purchasing function. Exhibit I-11 presents the questions which should be addressed when evaluating purchasing.

Exhibit I-11

PURCHASING FUNCTION EVALUATION QUESTIONS

PROCEDURES AND POLICIES

- Does the purchasing department have a clear set of procedures and policies?
- Are the procedures and policies formal or informal?
- What are the local, state, and federal legal requirements governing purchasing policies and practices?
- How is compliance with these requirements ensured?
- Is the utility currently in compliance?
- When is a purchase exempt from central purchasing?
- Are procedures and policies established for?
    - purchasing methods, biddable and non-biddable items
    - emergency orders
    - quality and control
    - inventory levels
- Is disposal of surplus and scrap property centrally controlled?

ORGANIZATION

- Does a current Organization Plan (Chart) exist for purchasing?
- Are lines of authority and responsibilities clearly defined?
- Do job descriptions exist for each position in purchasing?
- Does a procedural manual exist for purchasing and is it utilized?
- Does the manual include?
    - the purchasing department
    - the user departments
    - the receiving department
    - vendors

Exhibit I-11 (Con't)

STAFFING

- Does the purchasing staff meet the organizational needs (job descriptions) of the utility?
- Is the staff bonded?
- Is the staff effectively utilized?
- What is the purchasing staff's understanding of wastewater utilities?
- Does the staff receive relevant training?
- Does the staff have a good attitude and work to complement the other utility functions?

PLANNING

- How are expenditures budgeted? What other functions are involved?
- Is a time schedule established to provide sufficient lead time in procurement?
- Are past emergency orders reviewed to minimize its future occurrence?
- To what extent are purchase orders reviewed?
- Is the quality of merchandise reviewed in planning future purchases? What about vendor service?
- Do reorder points exist for inventory items? How are these established?
- How often are inventory levels reviewed?
- How do levels relate to utility policies?
- Are distribution practices planned and periodically upgraded?

MANAGEMENT CONTROLS

- Do purchase orders retain sufficient information?
    - order data
    - article ordered and quantity

Exhibit I-11 (Con't)

  - date of receipt
  - distribution
  - inventory level
  - requesting department
  - vendor
  - procurement method
  - cost (unit and total price)

- Are periodic reports prepared describing?

  - open purchase order status
  - purchases by vendor
  - purchases by buyer
  - departmental budget status

- Who receives these reports and how often?

- Is a vendor history available to assist in the planning of purchases?

- How are inventory levels recorded? Is the system adequate?

- What measures have been taken to ensure the security of purchases and inventory?

- How are shipments, part shipments, and backorders recorded to provide a running tabulation of open purchase orders?

- How often are purchasing forms and other controls reviewed for relevance and clarity? How is this information filed?

Management Information Systems

As wastewater utilities become increasingly more complex to operate and manage, information systems are becoming more important to successful operations. Information systems should or can provide support to every function in the utility. The basic role of the information systems function in the utility is to provide information for:

- process control and monitoring
- preventive maintenance
- billing and collection
- personnel payroll, benefits, etc.
- purchasing and inventory control
- project control
- accounting
- financial data
- engineering monitoring
- operations controls
- management controls
- budgets and cash flows
- capital improvement programs
- fixed assets

To effectively evaluate the information systems function requires identification of (1) information needs of each function; (2) the extent to which these needs are met and (3) the extent to which information systems reports are used at all levels of management. Equally important are identifying areas and functions where there is no current use of information systems but which could be improved with their use (e.g., preventive maintenance or inventory control).

Exhibit I-12 presents the management information system evaluation questions which should be addressed.

Exhibit I.12

MANAGEMENT INFORMATION SYSTEM FUNCTION EVALUATION QUESTIONS

POLICIES AND PROCEDURES

- Does the utility have specific policies about the use of information systems?
- Do the policies include
  - internal or external hardware
  - sharing computer time
  - documentation requirements
  - what can be automated
  - security considerations
  - funding of the management information system?
- How are costs shared across the utility?
- What backup and recovery policies have been established?
- Does the utility have an overall management information system?
- Are there written procedures for management information systems?

ORGANIZATION

- Does a current organization chart exist for a management information system?
- Is its supporting role to other functions clearly defined?
- Are the responsibilities and requirements (job descriptions) of information system staff detailed?
- Does a procedural manual exist for internal and external use?
- Where are the information system facilities located?

STAFFING

- Does the staff serve the organizational needs (job descriptions) of the utility?
- What is the information systems staff's technical background?
- What is the average tenure, by level, of information system personnel?

Exhibit I-12 (Con't)

PLANNING

- Has the utility determined its information requirements?
- Is the use of information system services scheduled between functions to provide a uniform work load?
- How well coordinated is the interaction between users and the information system staff?
- How is the potential for new systems evaluated?
- Are records of run-time utilized to assess hardware requirements?
- When is system useability evaluated? Who is involved in these evaluations?
- What procedures are available to make system changes (software or hardware)?

MANAGEMENT CONTROLS

- Are inputs and outputs controlled by user departments and the information systems department?
- How are the following recorded and reported upon?
    - activity
    - transactions
    - utilization
- Is this information aggregated for use throughout the utility?
- Are there quality control checks on reports?
- How secure is the data processing information?
- Is run-time recorded? How?
- How are computer costs recorded? Are the costs allocated across departments according to policies?
- Is there a mechanism to document and communicate system modifications?

Wastewater Facility Functions

The key to efficient, continuous wastewater collection and treatment is in the wastewater facility functions, i.e., operations and maintenance. The other utility functions, management and support services, provide direction and assistance to enable the facility functions to perform their work.

A wastewater facility is comprised of a number of working systems that all must be operated and maintained. These include:

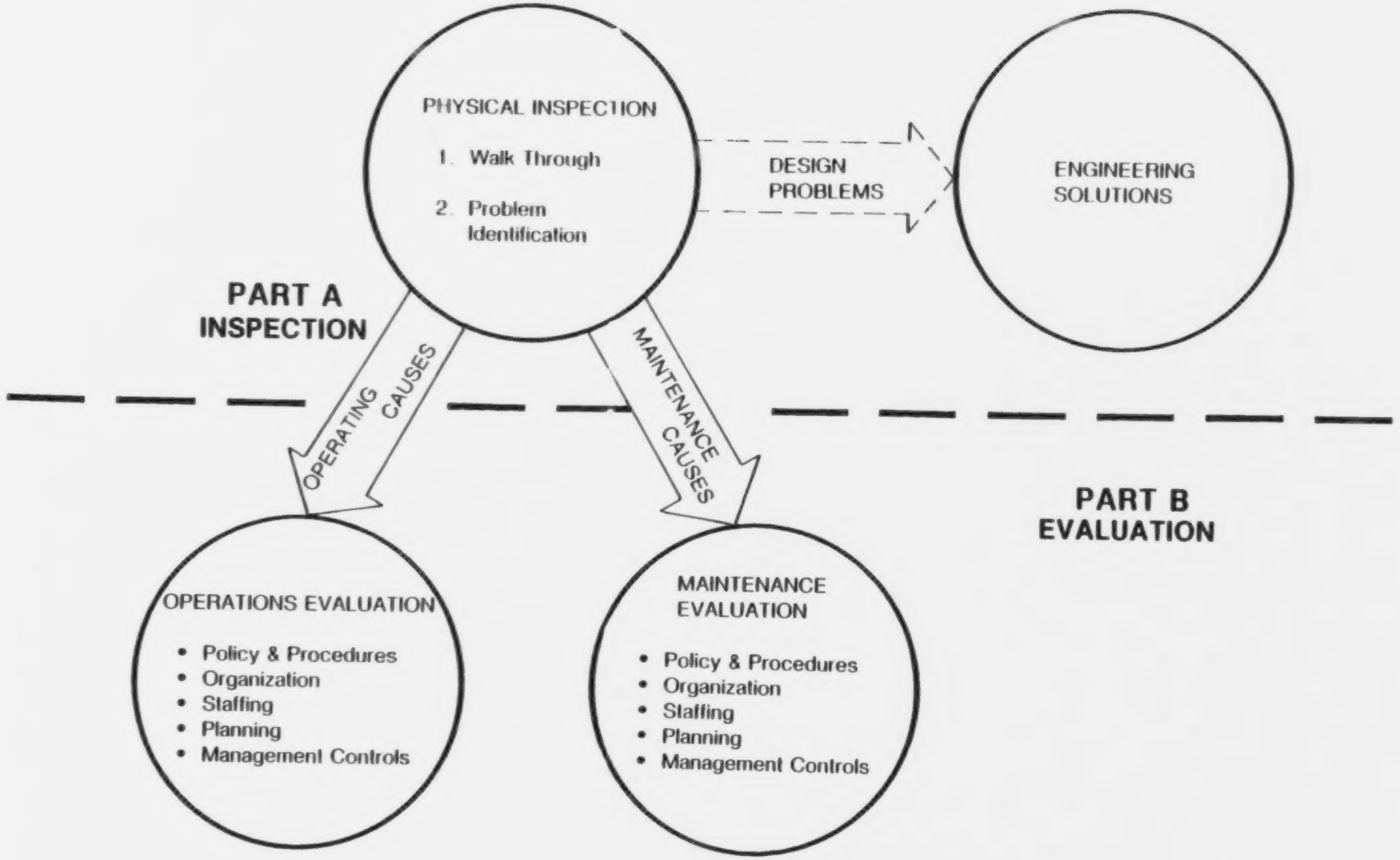
- wastewater collection system
    - collection
    - interceptors
    - pump stations
- wastewater treatment system
    - preliminary treatment
    - primary treatment
    - secondary treatment
    - advanced waste treatment
- sludge system
    - treatment
    - ultimate disposal
- energy recovery
- laboratory
- vehicles
- buildings

Each system of a wastewater facility is interactive with each other. Because of these interdependencies, the evaluator must examine not only specific problems for each system, but the affect of problems on other systems. For example, in preliminary treatment, poor grit removal can result in excessive wear in influent pump impellers. Therefore, when evaluating the facility functions, all interactions must be reviewed to ensure that major problems are identified for correction.

The facility functions are evaluated in a two-part process, as illustrated in Exhibit I-13. Part A includes a physical inspection of the facility to identify equipment and process problems. Part B is an evaluation of the procedures and policies, organization, staffing, planning, and management controls. In some cases, these will be design-related problems requiring

EXHIBIT I-13

EVALUATION OF FACILITY FUNCTIONS


PHYSICAL INSPECTION
1. Walk Through
2. Problem Identification
DESIGN PROBLEMS
ENGINEERING SOLUTIONS
PART A INSPECTION
OPERATING CAUSES
MAINTENANCE CAUSES
PART B EVALUATION
OPERATIONS EVALUATION
• Policy & Procedures
• Organization
• Staffing
• Planning
• Management Controls
MAINTENANCE EVALUATION
• Policy & Procedures
• Organization
• Staffing
• Planning
• Management Controls

engineering solutions. In other cases, however, problems result from operations and maintenance management practices. Therefore, evaluations should focus on finding the underlying reasons for the problems identified in the physical inspection and uncover problems and causes not identified in the physical inspection.

A valuable aid in performing both the physical inspection and the operations and maintenance evaluations is the standardized U.S. EPA Report on Operation and Maintenance of Wastewater Treatment Plant - Form 7500-05. The information recorded on this form provides both a checklist for the physical evaluation and a guide for the operations and maintenance evaluations.

The following presents a brief discussion of the physical inspection followed by discussion of the operations and maintenance evaluations.

Part A: Physical Evaluation

Performing the physical evaluation of the facility is conducted in two steps:

- facility walk through.
- problem area identification.

Step 1: Walk Through

The wastewater facility supervisor can assist the evaluator by providing reference materials and making key personnel available at the beginning of the physical inspection. Data including the NPDES permit, compliance reports, plant records (operations and maintenance) and any previous or ongoing studies including facility plans, sewer system evaluation surveys, engineering reports and comprehensive plans should be provided. A map of the utility service area should be available so that the location of the plant, pump stations, and users can be understood by the evaluator.

The plant manager or chief operator should provide a complete tour of the facility during which the evaluator should watch for and ask about:

- excessive solids passing over clarifier weirs;
- excessive odors;
- abnormal color of wastewater in various process stages;
- any unusual equipment such as special pumps, chemical feeders, temporary construction on systems which are being used to correct problems (or which may cause them);
- equipment accessibility;

- evidence of flow through by-pass channels;

- process flexibility; and

- treatment units out of service - why and how long.

From the preliminary information, interviews and inspection, the evaluator will have an overall view of the facility functions. In addition, the facility supervisor may gain some insight into problem areas in the facility operation which he can discuss with the evaluator. It is important that a dialogue be established between the supervisor (and operators) and the persons doing the physical inspection.

Step 2: Problem Area Identification

The evaluator should review the results of the inspection and identify problem areas and their effect on each component of the operation and maintenance of the facility. The problems identified should be reviewed and discussed with the facility supervisor and staff before the physical evaluation report is prepared.

Potential problem areas which should be covered are:

- influent characteristics;
    - combined sewer loads
    - infiltration/inflow
    - industrial contributions
    - diurnal/seasonal loading variations

- process control;

- unit operations;

- equipment condition; or

- other problems particular to the plant.

The basis for reviewing the above areas should be the Field Manual for Performance Evaluation and Trouble Shooting at Municipal Wastewater Facilities, published by the Municipal Operations Branch of the U.S. EPA, M.O. #16.

The physical inspection results should provide the evaluator with two pieces of key information:

1. Whether or not there is a major design problem which can only be solved with an engineering solution.

2. Problem areas that can be solved through the evaluation of the operation and maintenance functions.

If the first condition exists, one of the recommendations will be to develop engineering solutions. In addition, the evaluator must conduct the evaluation of the operation and maintenance functions from the point of view of what can be done to minimize problems, if the design problems continue to exist.

When the second condition exists, the evaluator should use the results to tailor his evaluation of the operation and maintenance functions. This information allows the evaluator to look for specific practices which contribute to or cause the problems uncovered in the physical inspection.

Part B: Operations and Maintenance Evaluations

Part B is the comprehensive evaluations of the operations and maintenance functions. These are two separate reviews which will become part of the overall utility Comprehensive Diagnostic Evaluation.

The remaining sections discuss the operations and maintenance evaluations.

Operations Evaluation

Operational factors affecting plant performance range from qualitative factors such as the skills and attitude of operators (e.g., process knowledge and general aptitude), to physical constraints such as deficiencies in laboratory equipment or a lack of flexibility in process equipment.

The key activities in operations include:

- wastewater treatment
- sludge treatment/disposal
- energy recovery
- laboratory analysis

The evaluation of the operations function must focus on each activity and be assessed based on the five evaluation topics.

While each of the five evaluation topics must be covered for each activity, the following are three common areas of concern in the operations function:

1. Staffing
2. Management controls
    - plant monitoring
    - process control
3. Policy and procedures
    - operating procedures
    - technical references

The best engineered facility cannot perform to its potential without the efforts of capable staff. Conversely, many poorly designed facilities can perform satisfactorily and meet effluent standards through efforts of conscientious and capable operators. The evaluators must consider the abilities and limitations of the operating staff. Staff interviews may include the individual in charge of overall operations, the chief operator, specific unit processes operators (e.g., digester control operator), and laboratory staff.

Monitoring practices are a good indication of the emphasis placed on operations, and the operator's understanding of process control. Factors affecting a facility's monitoring capabilities are:

- sampling program;
- performance testing;

- analytical capabilities; and
- recordkeeping practices.

An effective process control program is essential if a treatment facility's performance is to be optimized. Process control, however, is not something that will be easily quantified by the evaluator. In most cases, the evaluators will have to rely on discussions with the plant superintendent and/or operators to supplement available records and the technical evaluation.

The key considerations in process control are:

- process knowledge;
- basis for control practices;
- past performance;
- operator emphasis on control; and
- recordkeeping.

The operating procedures and references enable the operator to achieve efficient plant operation. The operations manual prepared for the facility should be the most important reference. Other reference materials relating to operations include manufacturers' literature, publications by professional organizations (e.g., Water Pollution Control Federation) and U.S. EPA publications.

The basis concerns that need to be addressed and evaluated during the operations function review are presented in Exhibit I-14.

Exhibit I-14

OPERATIONS FUNCTION EVALUATION QUESTIONS

POLICIES AND PROCEDURES

- Is there a formal or informal set of policies for facility operations?
- Do policies address?
  - Remaining in Compliance
  - Maintaining Process and Cost Controls
  - Minimizing Expenses
- Is there a set of standard procedures to implement these policies?
- Are they written or informal?
- Do the procedures consider the following areas?
  - Safety
  - Emergency
  - Laboratory
  - Process Control
  - Operating Procedures
  - Monitoring
  - Labor Relations
  - Energy Conservation
  - Collection System
  - Pumping Stations
  - Treatment Process
  - Sludge Disposal
- Are the procedures followed in fact?

ORGANIZATION

- Is there an Organizational Plan (Chart) for operations?
- Does the Plan include?
  - Delegation of responsibility and authority
  - Job descriptions
  - Interaction with other functions (such as maintenance)
- Is the Organizational Plan formal or informal?
- Is the Organizational Plan available and understood by the staff?
- Is the Organizational Plan followed in fact?
- Is the Organizational Plan consistent with operating policies and procedures?

Exhibit I-14 (Con't)

- Is the Organizational Plan flexible? Can it handle emergency situations?

- Does the Organizational Plan clearly define lines of authority and responsibility in such subfunctional areas as?

    - laboratory
    - process control
    - equipment operation
    - instrumentation
    - sludge disposal
    - collection system
    - pump stations

STAFFING

- Is there an adequate number of staff to achieve policies-/procedures?

- Are staff members adequately qualified for their duties and responsibilities?

    - Certification
    - Qualifications
    - Ability
    - Job Performance
    - Understanding of Treatment Processes

- Is staff effectively utilized?

- Are training procedures followed for?

    - Orientation of new staff
    - Training new operators
    - Training new supervisors
    - Continuing training of existing staff
    - Cross training

- What training procedures are used?

    - Formal classroom
    - Home study
    - On-the-job training
    - Participation in professional organization

Exhibit I-14 (Con't)

- Does the training program include?
    - laboratory procedures
    - treatment processes
    - instrumentation
    - equipment trouble-shooting
    - handling personnel problems
- Does management encourage staff motivation?
- Does management support its first line supervisors?
- How is staff motivation maintained?
    - encouragement for training
    - job recognition
    - promotional opportunities
    - salary incentives
    - job security
    - working environment

PLANNING

- How are operating schedules established?
- Do they attempt to attain optimum staff utilization?
- Are line supervisors included in manpower scheduling?
- Are staff involved/informed in manpower planning?
- Is there sufficient long-term planning for staff replacement and system changes?
- Are there procedures in manpower staffing for emergency situations?
- How are process control changes initiated?
- How do process control changes interact with management controls?
- How effectively are laboratory results used in process control?
- Are there emergency plans for treatment control?

Exhibit I-14 (Con't)

- Is there an effective energy management plan? Is the plan utilized?
- To what extent are operations personnel involved in the budgetary process?
- Do budgets adequately identify and justify the cost components of operations?
- Are future budgets based on current and anticipated operating conditions?
- Do operating and capital budget limits constrain operations (capital replacement and improvements)?
- Can budget line items be adjusted to reflect actual operating conditions?

MANAGEMENT CONTROLS

- Are the following documents maintained in a current state?
    - Operating Reports
    - Work Schedules
    - Activity Reports (time cards)
    - Performance Reports (lab, supplies, energy)
    - Expenditure Reports (labor, supplies, energy)
    - Cost Analysis Reports
    - Emergency and Complaint Calls
- Do the reports contain sufficient information to support their intended purpose?
- Are they useable and accepted by the staff?
- Are reports being completed as required?
- Are reports consistent with one another?
- Are reports used directly in process control?
- Are the reports reviewed and discussed with operating staff?
- What type of summary reports are required?
- To whom are they distributed and when?

Maintenance

Maintenance directly affects the ability of the facility to run efficiently and remain in compliance with its NPDES permit. There are two types of facility maintenance:

- Corrective Maintenance
  - puts back in operation malfunctioning equipment; and
  - avoids or minimizes possible compliance violations
- Preventive Maintenance
  - reduces facility operating costs by avoiding breakdown and corrective maintenance;
  - improves the wastewater facility's reliability by minimizing out-of-service time for equipment; and
  - increases the useful life of equipment and avoids costly premature replacement.

The evaluation of the maintenance function must focus on the ability to maintain the following system components:

- process equipment
- wastewater collection system
- vehicles
- buildings and grounds

While each of the five evaluation topics must be covered for each component, the following are three common areas of concern in the maintenance function:

- staffing and training;
- planning and scheduling; and
- management control
  - records systems
  - inventory control

Only well-trained, competent staff can be expected to perform adequate inspections, repairs, and preventive maintenance. Wastewater facilities maintenance is complex and requires a variety of skills including: electrical, mechanical, instrumentation, automotive and building maintenance. Because many of these skills are not readily available, an ongoing training program is essential.

Maintenance planning and scheduling is essential to effectively perform preventive and corrective maintenance. The major constraints in planning and scheduling are emergency repairs versus routine maintenance. The maintenance supervisor must prepare work schedules listing job priorities, work assignments, available personnel, and timing.

A detailed records system is the basis of any maintenance program. Records are used to establish maintenance histories on equipment, diagnose problems, and anticipate and therefore avoid failure through preventive maintenance. Records systems can vary from a logbook or card system to a fully automated computer system depending upon utility size.

A central inventory for spare parts, equipment, and supplies must be maintained and controlled. The basis for the inventory should be manufacturer's recommendations supplemented by maintenance experience. Inventories must be kept at levels sufficient to avoid process interruptions. The control of the inventory is usually by a card system with predetermined reorder points allowing for procurement lead times.

A maintenance cost control system should be an integral part of every wastewater facility. Budgets must be developed from past cost records and are usually categorized according to preventive maintenance, corrective maintenance, and major repairs. Costs over a given year must be compared to budget on a periodic basis to control maintenance expenditures. Evaluating costs in this manner provides control over expenditures and provides a basis for development of future year budgets.

Each of the basic elements of a maintenance program is discussed in more detail in Maintenance Management Systems for Municipal Wastewater Facilities, EPA, 68/01/0341, March 1973. This document can serve as a primary reference for the evaluator and the utility manager/maintenance staff.

The basic concerns that need to be addressed and evaluated during the review of the maintenance program are presented in Exhibit I-15.

Exhibit I-15

MAINTENANCE FUNCTION EVALUATION QUESTIONS

PROCEDURES AND POLICIES

- Is there a formal or informal set of policies for facility maintenance?
- Do Policies Address?
  - Remaining in Compliance
  - Performance Objectives
  - Maintaining Process and Cost Controls
  - Minimizing Expenses
  - Staying Within Budgets
- Is there a set of standard procedures to implement these policies?
- Is it written or informal?
- Do the procedures consider the following areas?
  - Equipment record system
  - Maintenance planning and scheduling
  - Work orders
  - Inventory management
  - Operating procedures
  - Emergencies
  - Maintaining process control
  - Labor relations
  - Energy conservation
- Are the procedures followed in fact? Are they effective?

ORGANIZATION

- Is there an Organizational Plan (Chart) for maintenance?
- Does the Plan include?
  - Delegation of responsibility and authority
  - Job descriptions
  - Interaction with other functions (such as operations)
- Is the Organizational Plan formal or informal?

Exhibit I-15 (Con't)

- Is the Organizational Plan available to and understood by the staff?
- Is the Organizational Plan followed in fact? Is it effective?
- Is the Organizational Plan consistent with policies and procedures?
- Is the Organizational Plan flexible? Can it handle emergency situations?
- Does the Organizational Plan clearly define lines of authority and responsibility in such subfunctional areas as?
    - mechanical
    - electrical
    - instrumentation
    - buildings and grounds
    - automotive
    - supplies and spare parts

STAFFING

- Is there an adequate number of staff to achieve policies-/procedures?
- Are staff members adequately qualified for their duties and responsibilities?
    - Certification (esp. mechanics and electricians)
    - Qualifications
    - Ability
    - Job performance
    - Understanding of maintenance procedures
- Is staff effectively utilized?
- Has the potential for borrowing personnel been considered?
- Are training procedures followed for?
    - Orientation of new staff
    - Training new maintenance personnel
    - Training new maintenance supervisors
    - Continuing training of existing staff
    - Cross training

Exhibit I-15 (Con't)

- What training procedures are used?
  - Formal classroom
  - Home study
  - On-the-job training
- Does the training program provide specific instruction to the various maintenance disciplines?
  - mechanical
  - electrical
  - instrumentation
  - automotive
  - building maintenance
  - inventory control
- Does management encourage staff motivation?
- Is staff motivation maintained by?
  - Encouragement for training
  - Job recognition
  - Promotional opportunities
  - Salary incentives
  - Job security
  - Working environment
- Is the staff committed to a maintenance program?

PLANNING

- Are maintenance activities planned? Formally or informally?
- Does the utility have sufficient management controls to affect realistic planning and scheduling? If the controls exist are they utilized?
- To what extent do the other utility functions become involved in the planning process?
- Are operating variables exploited to simplify maintenance efforts?
- Is efficient staff utilization a significant factor in planning?

Exhibit I-15 (Con't)

- To what extent is the supplies and spare parts inventory planned in conjunction with maintenance activities?
- Have minimum and maximum levels been established for all inventory items?
- Does maintenance have an emergency plan in harmony with the utility emergency plan?
- Is it up to date? Is the staff knowledgeable about emergency procedures?
- Does a plan exist for returning to the preventive maintenance mode following an emergency?
- Are preventive maintenance tasks scheduled in accordance with manufacturer's recommendations?
- Is adequate time allowed for corrective maintenance?
- Are basic maintenance practices (preventive and corrective) and frequencies reviewed for cost-effectiveness?
- Do the management controls provide sufficient information for accurate budget preparation?
- Does the maintenance department receive feedback on cost performance to facilitate future budget preparation?
- To what extent are maintenance personnel involved in the budgetary process?
- Do the management controls provide sufficient information for accurate budget preparation?
- Do budgets adequately identify and justify the cost components of maintenance?
- Are future budgets based on current and anticipated operating and maintenance conditions?
- Do maintenance and capital budget limits constrain preventive maintenance (equipment replacement and improvements)?
- Does the maintenance department receive adequate feedback on cost performance?

Exhibit I-15 (Con't)

- Can budget line items be adjusted to reflect actual maintenance conditions?

MANAGEMENT CONTROLS

- Does a maintenance record system exist? Does it include?
    - as-built drawings
    - shop drawings
    - construction specifications
    - capital and equipment inventory
    - maintenance history (preventive and corrective)
    - maintenance costs

- Is the base record system kept up-to-date as part of daily maintenance practices?

- Is there a work order system for scheduling maintenance? Is it explicit or implicit?

- Do work orders contain?
    - date
    - work order number
    - location
    - nature of problem
    - work required
    - time requirements
    - assigned personnel
    - space for reporting work performed, required supplies, time required, and cost summary
    - responsible staff member and supervisory signature requirements

- When emergency work must be performed without a work order, is one completed afterwards?

- Are work orders useable and accepted by staff as essential to the maintenance program? Are they actually completed?

- Is work order information transferred to a maintenance record system?

- Does a catalog or index system exist for controlling items in inventory?

Exhibit I-15 (Con't)

- Are withdrawal tickets used for obtaining supplies from inventory?
- Do the tickets contain cost information and interact well with inventory controls and the work order system?
- Is the cost and activity information from work orders aggregated to provide management reports? Is this information also used for budget preparation?
- Is maintenance performance discussed regularly with the staff?
- How is the cost of contract maintenance or the use of specialized assistance recorded?
- Are there adequate safeguards and penalties to prevent maintenance cards from being returned without the work being done?
- Is the preventive maintenance record checked after an emergency equipment failure?

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CHAPTER II

SELECTED UTILITY MANAGEMENT ISSUES

INTRODUCTION

It is generally recognized that a wastewater utility must be self-sustaining if it is to operate efficiently and effectively. To be self-sustaining requires:

- organizational independence
- management capability
- public support
- adequate staff
- financial self-sufficiency

Political, managerial and financial constraints have a significant effect on the ability to be self-sustaining. In chapter I, Comprehensive Diagnostic Evaluation, a methodology was presented to evaluate a wastewater utility. It presented the management framework of a self-sustaining utility including a review of the general, support services, financial and treatment facility management functions of a utility. The general characteristics of each of these management functions were described and key questions were identified to evaluate each function.

While any of these management functions can affect a utility's ability to be self-sustaining, there are three areas of particular concern in wastewater utility management. These are:

- Institutional/Organizational
- Financial
- Public Support and Public Involvement

These three areas are reviewed in detail in this chapter.

INSTITUTIONAL/ORGANIZATIONAL STRUCTURE

The institutional structure of a utility, as well as its internal and external organization are important considerations in developing a self-sustaining utility. These affect:

- who controls the utility;
- how the utility is managed; and
- how capital and operating revenues are generated.

The preferred institutional structure for any given utility depends upon its political, financial and operational environment. There is a broad range of possible structures; most, however, are variations or combinations of the following:

1. a municipal department, with or without sanitary districts, under which the facilities are local government-owned and operated;

2. a municipal authority or commission under which the local government owns the facilities but management and operations are separated from general municipal activities; and

3. an independent authority or commission, fully autonomous from the local municipality, with its own appointed or elected governing board.

The following reviews some of the advantages and disadvantages of each type of institutional structure to provide a basis for evaluating its appropriateness in particular situations.

Municipal Department

A municipally owned and operated utility usually exists as a department within the local government. The typical intergovernmental relations are shown on exhibit II-1. In most cases, the department has direct responsibility for treatment facility operation and maintenance and relies on other government departments for general management and support services such as accounting, personnel, data processing and purchasing. The financial structure is either integrated into the general municipal accounts or is maintained as a separate enterprise fund. Special taxing districts may be established as a means to pay debt for utility costs through ad valorem taxes. Budgets are usually part of the general municipal budget.

Municipal departments are most appropriate when:

- the utility operates only within one political jurisdiction;
- the majority of the population is served; and
- the local municipality is financially sound.

EXHIBIT II-1

WASTEWATER UTILITY AS A MUNICIPAL DEPARTMENT

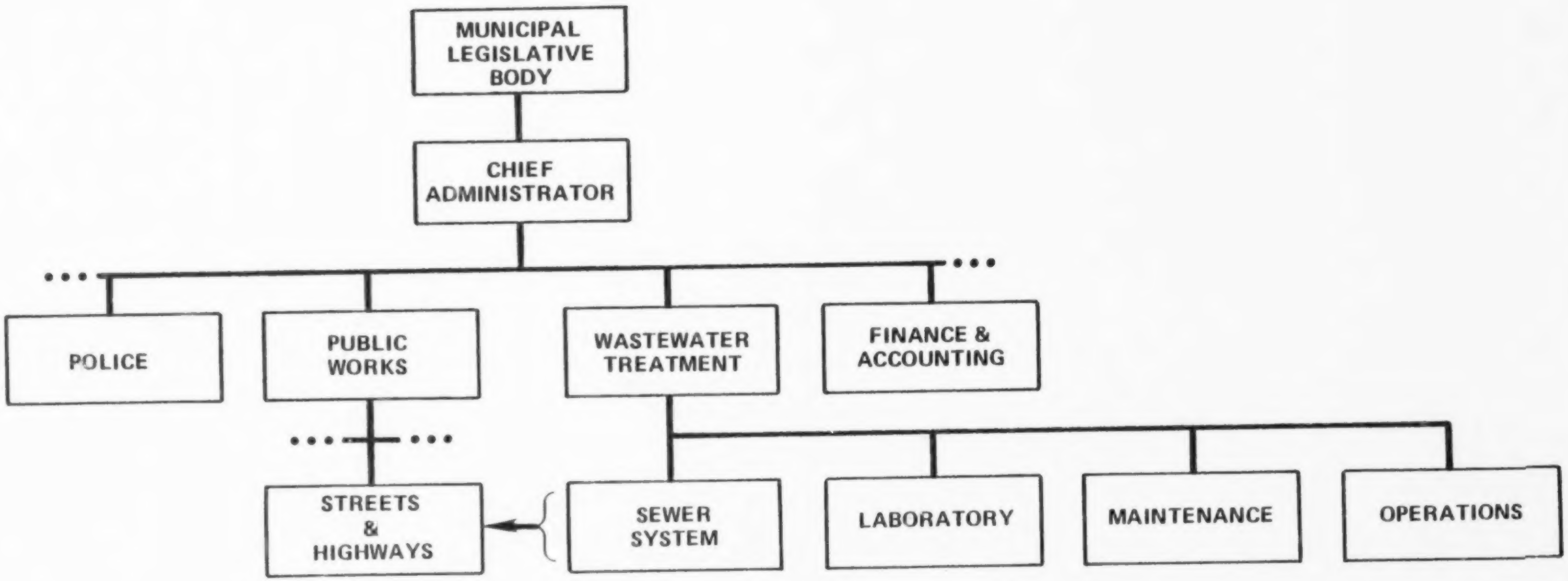
MUNICIPAL LEGISLATIVE BODY
CHIEF ADMINISTRATOR
POLICE
PUBLIC WORKS
WASTEWATER TREATMENT
FINANCE & ACCOUNTING
STREETS & HIGHWAYS
SEWER SYSTEM
LABORATORY
MAINTENANCE
OPERATIONS

Exhibit II-2 summarizes the advantages and disadvantages of a utility operated as a municipal department. The following discussions address these in terms of control and accountability, management and finance.

Control and Accountability

The municipally-owned and operated utility provides elected officials with complete control of:

- user charge rates;
- capital improvements;
- budgeting; and
- delineation of service areas and collection systems.

In exercising this control, elected officials act to serve the interests of the public within their jurisdiction. Such actions may or may not be in the best interest of the utility when key questions arise. For example, when rate increases are required, decisions may be based upon political issues rather than the utility's revenue requirements. Conversely, political pressure helps to ensure that utility costs do not get out of hand.

When the utility serves only the jurisdiction and the majority of the population are served, full control and accountability by elected officials is a sound concept. When the utility serves other jurisdictions, however, the other jurisdictions are not adequately represented. In such cases, the concept of a jointly sponsored authority or commission may be more desirable since it provides joint control and accountability by each participating jurisdiction. Authorities are discussed in a subsequent subsection.

When only a small portion or pockets of the jurisdiction are served, there is the potential to be overlooked or overruled by the balance of the jurisdiction. In such cases, special sanitary districts can be formed to represent the interests of the people served and provide financial accountability.

Management

A municipal wastewater department usually provides the operation and maintenance functions for the utility. The other utility functions are often provided by other municipal departments including:

- public works;
- finance;
- planning;
- personnel;
- purchasing;
- data processing; and
- engineering.

EXHIBIT II-2

LOCAL GOVERNMENT-OWNED AND OPERATED UTILITY

	Advantages	Disadvantages
Control and Accountability	• maximum control by local government	• Policy issues are subject to political pressures that are not utility-oriented (e.g., growth control)
	• closely accountable to elected officials	• Key activities may be controlled by other departments (e.g. maintenance of sewer system, finance, billing)
		• rate setting is political and may not address utility needs
Management	• supported by other municipal departments and avoids duplication of functions (e.g., separate finance or purchasing functions)	• constrained by local government rules and regulations (e.g. salary, staffing, etc.)
		• may be too reliant on other local government departments for key services (e.g., finance, billing, etc.)
		• management subject to override for political reasons
Finance	• raising capital can be done without general obligation bonds	
	• short-term financial assistance may come from the general fund	• utility is less likely to be self-sustaining requiring subsidies between utility and general fund
		• investors may be less willing to purchase bonds because of potential political pressures

For small utilities, having these functions performed by other departments is beneficial since the utility could not afford to maintain the same level of service by itself and it avoids unnecessary duplication of activities. For larger utilities, however, this type of support is frequently inadequate to serve the utility's needs.

While having some utility functions managed and performed by other municipal departments is appropriate in certain instances, it can create disadvantages. For example, authority over the sewer system is often part of the public works department. With its many other responsibilities, the Department of Public Works often places sewer construction inspection and maintenance in a position of low priority. This may affect the utility manager's ability to control daily operations of the facility because of decisions made outside of his control.

As a municipal department, personnel policies are controlled by the general government. This may constrain the utility's operation by establishing:

- pay scales below those required to attract and maintain good operators;
- staff size below the level necessary for proper operations; and
- staff qualifications or selection criteria that are inconsistent with the utility's needs.

Finance

The key financial issues for a municipally operated utility are raising capital and operating revenue. If the municipality is in a strong financial position, it provides the utility with access to generally less expensive capital, typically through general obligation or revenue bonds. (The types of capital financing and cost recovery available to utility departments are more completely discussed in the financial management section of this chapter.)

As a department within a local government, a utility has the advantage of being able to draw on or borrow money from the general fund when unexpected shortfalls are encountered.

A problem frequently encountered within a municipal wastewater department is that the utility is subsidized by the local government. This occurs because some indirect costs are not charged to the utility such as support services provided by other departments. In such cases, the utility appears to be self-supporting when in fact the general government and the entire tax base are supporting the operation.

Authorities

There are two basic forms of authorities:

- a municipal authority wherein the municipality which retains ownership of the facilities while most management control is vested in the authority; and

- an independent authority which owns and manages the facilities.

Exhibit II-3 illustrates the organization of a municipal authority. Typically, it is operated by a governing board or commission which is appointed by the chief executive of the municipality. The commissioners' terms of office are frequently overlapping and generally not coterminous with the chief executive's. Financial and accounting systems are completely separate from the city's and the authority is vested with the power to establish its own budgets and set utility rates without municipal approval. The authority may also be empowered to issue debt, although direct voter referendum or council approval of bond issues may be required. The major advantage of this type of arrangement is its operational autonomy. This autonomy provides insulation from political pressure on budgets and rates.

An independent authority has similar operational autonomy. In addition, it assumes ownership of the utility. This type of authority is usually created by a special act of the state legislature which defines how the authority is to be structured and operated. A board or commission arrangement is the typical governing structure which can be amended only by state legislation. Through creation of such an authority, a municipality can shift the burden of a substantial service to an essentially separate jurisdiction. The degree of control a municipality can maintain over these systems once such an authority has been established depends on the authority's enabling legislation. Continued control over the governing board appointment process, board composition, terms of office, provisions concerning the use of surplus revenues and the like are all mechanisms by which a municipality can ensure that the independent authority will be accountable to municipal interests. In practice, however, a satisfactory balance between independence and accountability is difficult to achieve.

An authority type of operation is most appropriate when:

- two or more local governments have major participation in the utility services;
- the utility is large and operates as a stand alone operation;
- there are financial problems in the local government, particularly in raising capital;
- state and/or local law and requirements on the local government constrain facility operations; and
- local political issues interfere with utility operations.

Exhibit II-4 summarizes the advantages and disadvantages of authorities. The following section discusses these in terms of control and accountability, management and finance.

EXHIBIT II-3

MUNICIPAL AUTHORITY
ORGANIZATION CHART

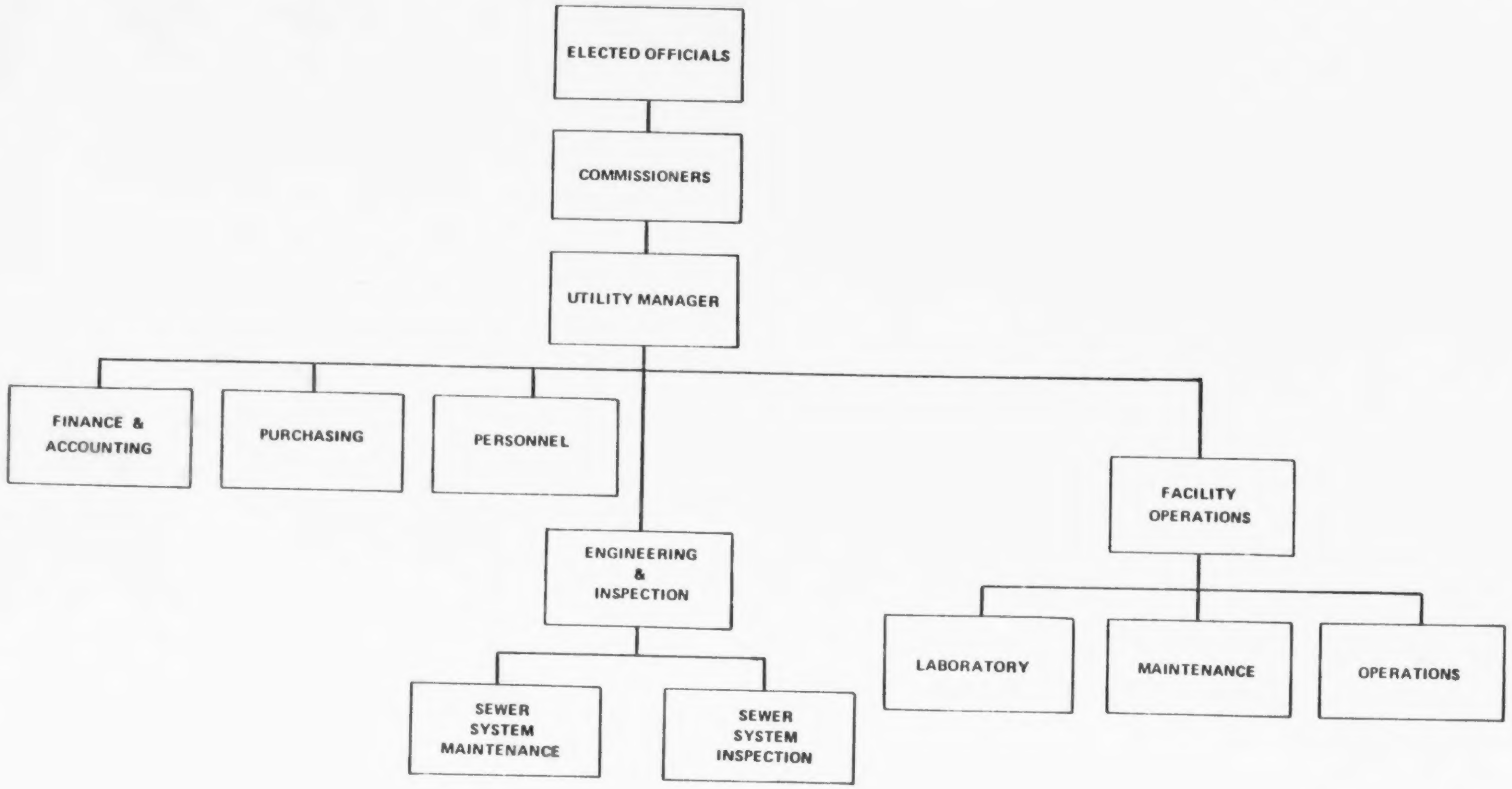
ELECTED OFFICIALS
COMMISSIONERS
UTILITY MANAGER
FINANCE & ACCOUNTING
PURCHASING
PERSONNEL
ENGINEERING & INSPECTION
SEWER SYSTEM MAINTENANCE
SEWER SYSTEM INSPECTION
FACILITY OPERATIONS
LABORATORY
MAINTENANCE
OPERATIONS

EXHIBIT II-4

AUTHORITY-OPERATED UTILITY

	Advantages	Disadvantages
Control and Accountability	• control is independent of other local issues/politics • relieves local government from political burden of establishing a self-sustaining utility	• not accountable to general government and local officials • loss of local government control of a major functional area • local government loss of a policy-making area • creates another level of "government"
Management	• utility has complete management system--not dependent on local government • utility can organize in best manner for operations, management only deals with utility issues • investors prefer independence from local politics	• replicates existing support systems • may expand beyond need, when not accountable to local government • loss of the use of generally cheaper general obligation bonds
Finance	• financial issues not mixed with local government financial issues • rate setting is not constrained by "other" political issues • utility is self-sustaining	• capital funding may be more expensive because it is primarily dependent upon revenue bonds • has no taxing power to act as a financial backup to user charges

Control and Accountability

One of the principal advantages of an authority is that control is removed from general government and it is less affected by unrelated political issues. This is particularly true when there are two or more political subdivisions served by the utility.

Even though formal control goes to the board or commissioners of an authority, in most cases there are still sufficient ties, formal or informal, to the local government and/or the public to assure accountability. Accountability exists because the authority officials are elected by the public or appointed by the elected officials participating in the authority.

Management

The most significant management advantage of the authority is its independence from local municipal departments. Management needs to deal only with utility related issues and can organize in a manner best suited to operate the facility. In addition, independence can avoid constraints on personnel hiring requirements and salary limitations enabling management to staff to proper levels and develop pay scales suitable to a utility operation.

A disadvantage of an authority operation is the duplication and higher costs of support services. To a certain extent, this can be avoided by developing agreements with local government to provide special services such as data processing.

Finance

A major advantage of an authority is its ability to raise both capital and operating revenues without affecting or being affected by local municipal constraints. (Capital financing is discussed in detail later in this chapter.)

Investors frequently regard authorities more favorably than municipal utilities because there is more clear separation of funds and less likelihood of diversion of utility revenues to the general municipal fund.

One major financial disadvantage is the loss of less expensive and more accessible capital which can be raised with general obligation bonds. Since authorities usually finance with revenue bonds, interest rates will be higher and bond reserve requirements more stringent.

In addition, since the authority is independent and self-sustaining, there is no short-term financial backup available as in the case of a local government operation. At the same time, the authority form avoids direct or hidden cross-subsidy between the local government and the utility.

Conclusion

- There is no "best" organizational structure. It depends on the political, managerial and financial condition of the municipality being served. There are financially and managerially strong systems under each organizational alternative. This suggests that, while the institutional structure is important, it is only one of several factors determining successful utility operation. A recent study of urban water systems found that a municipal utility can be operated successfully "...if the city government is strong financially, has a stable tax base, and assigns a reasonably high priority to water supply... The converse of this statement also appears to be true. Thus, while type of ownership can impact success, it is not in itself necessarily a determining factor."1/

- The experience of municipalities that have recently restructured their utility operations suggests that the more financially secure the existing municipal operation, and the longer its track record of self-support and demonstrated capability of meeting debt service coverage requirements, the less the need, from a financial perspective, for creating a new independent management structure.

- The decision as to whether or not to create a separate authority is to a large extent determined by the municipality's overall financial needs and political motivation to reorganize. For example, formation of the Boston Water and Sewer Commission provided the city with a much needed relief from a constant drain on general tax revenues. The form of an independent authority offered a mechanism whereby the city could assure that utility operations would be conducted on a fully self-supporting basis without the political burden of City Council members having to advocate the requisite rate increases.

1/ SCM-Martin Consulting Engineers and Temple, Barker & Sloane, Inc., "An Analysis of the Nation's Urban Water Systems: Characteristics, Investment Requirements and Policy Options," Institute for Water Resources, Department of the Army, December 1979, p. 9.

FINANCIAL MANAGEMENT

Sound financial management can aid utility managers in making policy and managerial decisions needed to plan, budget, account for and recover operating and maintenance costs and to finance capital improvements.

Financial management includes the establishment of fiscal policies and plans, the allocation of resources to meet the policies and plans, the identification, documentation and recovery of costs, the protection of funds and the timely dissemination of relevant financial information to utility management. Specifically financial management includes the following activities:

- planning;
- budgeting;
- accounting and financial reporting;
- cost recovery; and
- capital financing.

Each of these activities is discussed in the following section.

Planning

Planning is the means to decide in advance what the utility will do in the future, who will do it, and how it will be accomplished. Planning is like a road to get a person from one place to another. It establishes goals as to where a person should begin and end, objectives or milestones as to where the person should be during his trip, a timetable as to when the person should arrive and a measurement as to how far he has gone. When a person is "on course" the plan should show how far he has proceeded and how much he has to accomplish. When a person strays off the course, the plan should show where he strayed and what steps have to be taken to bring him back on course.

Utility responsibilities are broad and complex. The community which it serves is in a continual state of change. New developments for residential and industrial users are planned and constructed. This results in a constantly changing environment where wastewater volume and strength characteristics are directly affected by community plans. Under these circumstances, a sound program of comprehensive planning is one of the most important responsibilities of the utility manager.

Wastewater utility planning is concerned with the following major issues:

- what is the current and future wastewater requirement;

- what resources are needed to respond to this requirement (people, materials, equipment);

- what resources can be used more efficiently; and
- what wastewater functions can be provided more effectively and/or efficiently by the private sector.

For planning to be effective, the following basic conditions should be met:

- the people who manage the wastewater utility should be involved in the planning process. This includes not only the wastewater utility manager and staff, but also local administrative and legislative officials;
- the current and future wastewater requirements in a community must be determined. This requires the utility manager to understand the type of development planned for the community;
- the public should be involved in decisions about current and future wastewater services. While the public typically can identify with drinking water activities it has little perception of the process or problems associated with wastewater management. Public input can have a positive benefit in accomplishing utility goals and objectives and developing facility operating and capital budgets;
- planning should be comprehensive, including all wastewater functions (financial, support and facility management). Budget requests for wastewater services should include a determination of the anticipated service to be provided, an analysis of what will happen if the wastewater discharge is increased or reduced and an analysis of the cost of service at the requested level; and
- performance should be monitored in relation to the service levels requested in the plan. Regular performance monitoring can enhance the planning and replanning process.

When these general conditions are met, planning can become a vital part of the management process.

This section describes planning in its more formal sense. In many instances it tends to be carried on informally by wastewater utilities. It is important to identify and understand the steps required in the process, however, to fully develop effective wastewater utility planning. These steps include

- develop objectives for wastewater activities;
- develop quantitative measures of performance;
- develop budget requests based on objectives and measures of performance;

- establish a timetable and assign responsibilities; and
- monitor and evaluate performance in relationship to the budget.

These five steps are discussed in the following section.

Develop Objectives for Wastewater Activities

The first step in the planning process is to identify objectives for wastewater activities. Typical activities of a wastewater utility include:

- billing, meter reading and customer service;
- laboratory;
- operations;
- maintenance;
- industrial surveillance, monitoring; and
- general administration.

For each of the activities, objectives should be developed. Objectives should meet the following criteria:

- Result-oriented. They should focus directly upon what is to be produced.

- Specific. They should state what will be achieved in very narrow and precise terms. They should not encompass general statements of philosophy.

- Stated in measurable terms to determine whether an objective has been attained.

- Attainable within a specifically stated timeframe. Objectives should be associated with a specific point in time so that results can be evaluated when that point is reached.

- Related to the utility's overall objectives. As such, the objectives should be geared to achieving effluent and sludge disposal standards, to cost efficiency and to self-sufficiency.

An example of a wastewater treatment objective is:

> To maintain a monthly average concentration for BOD and suspended solids of 20 mg/l or less throughout the fiscal year.

> Many objectives are established by NPDES permit and regulatory agency requirements.

Develop Quantitative Measures of Performance

After objectives have been developed, utility managers must develop performance measures to analyze achievements relating to objectives. Performance measures are the yardsticks by which the results of an activity can be measured. Among the quantitative performance measures which can be used are:

- Wastewater loadings, which indicate the need for wastewater services. They measure the dimensions of the service and include flow and strength. Loading measures are critical because they help utility officials explain the level of service required by the wastewater facility and give perspective to the expenditure requests for funds to support wastewater activities.

- Workload, which indicates the amount of work actually performed by the utility.

- Efficiency, which establishes the relationship between resources used (people, materials and equipment) and results obtained. These measures, used in conjunction with workload measures, give utility managers insight into how well resources are being utilized. Examples of efficiency measures are:

  - dollars per 1000 gallons of wastewater treated;

  - kilowatt hours of electricity per 1000 gallons of wastewater treated;

  - kilowatt hours per ton of sludge generated; or

  - pounds of chlorine per 1000 gallons treated.

  Efficiency measures are derived by combining accounting expenditure data with other management information.

- Effectiveness, which determines how well an activity meets an objective. Effectiveness measures emphasize results. They show the progress made toward the achievement of an objective. An activity might be efficiently carried out at a very limited cost and in a timely manner, but it may not produce the results desired. The percent of BOD and suspended solids removed are examples of effectiveness measures and are available from management reports.

Utility managers must determine the types of measures which are needed to plan and monitor operations. This is part of defining management information requirements. Once decided, utility managers should instruct their staff or hire outside help to design information and accounting systems to capture and report this data.

Ideally, each wastewater activity should be evaluated by all performance measures. Appropriate and easily developed measures should be used in the planning effort. The key is to use performance measures which relate directly to the needs and objectives of the utility.

Develop Budget Requests Based on Objectives and Performance Measures

A major step in the planning process is to use objectives and performance measures to develop budget requests. This is a difficult task for it requires relating resources (costs) to outputs (services). Few standards exist in wastewater management to aid in this process. The best approach, however, is to develop an annual work plan for each activity. The work plan identifies:

- How much service is needed, based on wastewater loadings, to meet stated objectives/NPDES permit;
- How much work must be performed to treat these loadings, based on workload measures;
- How much personnel, materials and equipment will be required to perform this work, utilizing efficiency measures and past experience;
- What are the cost of services and consequences of an increase or decrease in wastewater loading (and resulting revenues); and
- What are the alternatives to the current methods of performing the activity and what are their costs and service implications.

The work plan for each activity then becomes the mechanism by which budget requests are developed and justified.

Establish Timetable and Assign Responsibilities

A timetable for each activity work plan should be established. Employees should be instructed as to whom is responsible for each activity, by when and how results will be measured. This should be communicated in writing to assigned employees.

Monitor and Evaluate Performance in Relation to Budget

The final step in the planning cycle is to monitor and evaluate performance. Performance is measured against the plan and is monitored throughout the year by a designated official. This monitoring would encompass the following considerations:

- Is performance at the anticipated level?
- Are costs higher or lower than anticipated?
- Have actual wastewater loadings increased or decreased from those anticipated?

Reports based on this monitoring procedure should be prepared on a periodic basis and distributed to the utility manager and chief administrator. Information gained through the monitoring process can be used to indicate and support the need for budget modifications.

Finally, the work plan should become the basis for a formal evaluation of the utility's performance. Such evaluations should be performed periodically and focus on:

- the utility's ability to achieve work plans within the budget and time constraints;
- service effectiveness; and
- barriers to and extraordinary achievements in effective service delivery.

Budgeting

Budgeting provides the mechanism to accumulate financial and performance data by activity, review the merits of each activity, compare each proposed activity to planned objectives and make decisions about the level and cost of services to be provided. The budget also serves as the main document for monitoring and controlling facility expenditures, measuring the quality of work performed by employees and assuring the availability of adequate resources to meet current operating and maintenance, capital outlay and debt service expenses.

Frequently, the wastewater utility budget is not presented in a format which provides utility management with relevant information for utility operations. Reasons for this include:

- the budget is organized by line items such as personal services, expenses and capital outlay and not by activity such as primary and secondary treatment, sludge dewatering or sludge disposal;
- the utility budget is integrated with the municipal budget and accordingly is more responsive to general government concerns than to self-sustaining enterprise; and
- the utility is financed in part with general property tax revenue and is not fully self-supporting.

Accordingly, this section is designed to provide utility and municipal officials with budgetary guidance where a utility desires to become self-supporting. Wastewater facility managers should review the concepts discussed in this section with finance officials in their jurisdiction. Topics included in this section are:

- Policy
- Operating, maintenance and equipment replacement budgets
- Capital budgets
- Flexible budgets
- Cost of service
- Budget narratives
- Budgetary control.

Policy

Wastewater utilities should adopt budgeting policies which are consistent with sound financial management and their overall objectives. Policies should be adopted which assure that the budget process or document:

- satisfies legal requirements established by Federal and state statutes, municipal charters, sewer use and other local ordinances;
- provides for proper administrative and legislative reviews;
- responds to planned utility objectives and timetables;
- provides for an operating and maintenance budget to be prepared, reviewed and adopted annually;
- balances approved expenses with anticipated revenues;
- presents requests by specific cost components (personal services, expenses, capital outlay) and by activities such as primary and secondary treatment;
- presents expense and revenue analyses by various levels of wastewater characteristics (different flow levels and strength characteristics);
- includes, for the useful life of the treatment works, a projection of plant and equipment replacement;
- establishes a contingency reserve to provide for emergencies or unforeseen expenses;
- includes a budget narrative to explain principal budget issues and objectives;
- provides performance measures and standards for each budgeted activity; and
- provides for open public hearings.

Once approved, the adopted budget should be communicated throughout the organization. Each employee should understand what is expected of him or her, by when and how performance will be measured.

The adopted budget should also be controlled and monitored through periodic reports which compare planned (budgeted) expenditures and revenues to actual performance. Objectives and timetables should be reviewed periodically by comparing actual performance to planned objectives established in the budget.

Budget control should be assigned to a responsible individual who will ensure that budgets are not overspent, review and approve budget transfer requests, prepare budget control reports and monitor utility expenditures to determine potential problems.

Operation and Maintenance Budgets

Typically wastewater activities are accounted for within the general fund, when the intent is to finance utility operations with property tax revenue, or within an enterprise fund when the intent is to finance utility operations with sewer service charges. Federal regulations restrict the use of general property tax revenues for purposes of financing the operation, maintenance and replacement costs of wastewater facilities financed with Federal construction grants. Utility managers should familiarize themselves with these user charge regulations in evaluating their sources of revenues to finance utility operations. (See the Cost Recovery section of this chapter for additional discussion.)

If the utility is to be accounted for in the general fund, the wastewater budget would normally be included in the municipal budget. If, however, the facility is to be accounted for in an enterprise fund, a separate and distinct budget is normally required. Regardless of which fund is applicable, an annual operating and maintenance budget should be prepared, reviewed and adopted annually.

The budget should reflect the managerial responsibility of the wastewater utility. As a general rule, organization classifications should be provided where significant managerial responsibility is delegated to an official. If a subordinate is responsible for managing a specific activity and achieving results, then that subordinate should have some budgetary responsibility and be held accountable for both activity and budgetary performance.

Activities should be established to further define the wastewater organization, activity classifications and utility managers to:

- reflect the actual utility structure,
- reflect sufficient detail for specific management responsibility,
- help management direct utility operations, and
- aid the legislative body and the public to understand utility operations.

Examples of wastewater activities are:

- Operations;
- Maintenance;
- Laboratory;
- Billing, meter reading and customer service;
- Industrial surveillance, monitoring, and pretreatment programs; and
- General Administration.

The budget should present each activity by management's desired level of detail and relate activities to the organization roles and responsibilities. In this manner, resources can be allocated and expenses recorded based upon wastewater operations. Detailed budgets can be developed for administrative purposes, while the legal budget or appropriation can be established at a more general level. This allows for flexibility in budget implementation and still provides the tools for budget monitoring and management on a responsibility basis.

The accounting system should reflect the budgeted activities and should record expenses at management's desired level of detail i.e., at the sub-activities level. (Refer to the Accounting and Financial Reporting section for a discussion on information requirements.)

Objects of expenditures are used to classify the various types of goods and services purchased. Normally, state statutes or local ordinances mandate that the budget be presented in a "line item" (object of expenditure) format. Line items are direct (under the control of utility managers) or indirect (utility costs which are under the control of another official). Examples of direct and indirect objects of expenditures are:

- Direct

    - Personal services for salaries, overtime, longevity.
    - Operating expenses for supplies, travel, electricity, gas, oil and diesel, chemicals.
    - Maintenance expenses for vehicles, equipment, buildings.
    - Capital outlay for equipment.

- Indirect
    - Debt service for principal payments and interest on debt.
    - Fringe benefits for pensions, employee insurance, vacation and sick pay.
    - Overhead for accounting, payroll, data processing, purchasing, revenue collection and investment costs.

The typical utility line item budget includes direct costs, as shown in Exhibit II-5. Certain indirect costs, for necessary utility expenses, are frequently included in other department budgets (i.e., debt service within the treasury budget). Depreciation, while a facility expense, is not a budgeted item. It is what is termed a "non-cash expense." Indirect costs should be recovered through the sewer service charge.

Utility budgets should combine the use of activity and line item classifications as illustrated in Exhibit II-6. This presentation maintains the basic line item classification (thus meeting legal requirements) while providing budgeted information by utility activities. This format, or variations of it, will facilitate cost-of-service analyses for rate setting.

Utility budgets should identify each revenue source and amounts by each revenue source. Typical revenue sources include:

Exhibit II-5

TYPICAL WASTEWATER UTILITY

LINE ITEM BUDGET

Utility

Personal Services

- Salaries
- Overtime
- Fringe Benefits

Total Personal Services

Expenses

- Insurance
- Vehicle Repairs, Fuel, etc.
- Supplies
- Electricity
- Gas, Oil and Diesel
- Maintenance
- Chemicals
- Equipment Rental
- Training
- Travel
- Parts
- Equipment Replacement
- Contingencies

Total Expenses

Capital Outlay

- Improvements
- Expansions
- Principal and Interest on Existing Debt
- Betterments

Total Utility

Exhibit II-6

WASTEWATER TREATMENT UTILITY

ACTIVITY BUDGET

LINE ITEM	ACTIVITY					
	PUMPING	OPERATIONS	MAINTENANCE	LABORATORY	ADMINISTRATION	TOTAL
Personal Services						
Salaries						
Overtime						
Fringe Benefits						
Total Personal Services						
Expenses						
Insurance						
Vehicle Repairs, Fuel, etc.						
Supplies						
Electricity						
Gas, Oil and Diesel						
Maintenance						
Chemicals						
Equipment Rental						
Training						
Travel						
Parts						
Equipment Replacements						
Contingencies						
Total Expenses						
Capital Outlay						
Improvements						
Expansions						
Principal and Interest on Existing Debt						
Betterments						

- general property tax
- sewer service charges
- septic disposal fees
- interest on investments
- miscellaneous revenues from rent and sale of equipment.

Utility management should balance anticipated revenues with planned expenditures and include anticipated revenues as part of the budget document. Anticipated revenues should reflect utility cost recovery policies (see Cost Recovery).

Capital Budgets

The wastewater utility is one of the largest capital structures in a community. Depending upon the responsibilities associated with it, the utility capital facilities may include the collection, pumping and treatment system. Capital budgets involve the development of shortand long-term plans to maintain and expand the utility's physical facilities, as required. This includes planned expenditures for buildings, land, sewers and major equipment which have significant value and have a useful life of several years.

The capital improvement program should include a list of each proposed capital item or project to be undertaken, the year in which it will be started, the amount expected to be expended in each year and the proposed method of financing the expenditures. Based on this plan (usually a five-year projection), summaries of capital activity in each year can be prepared and included in the utility's annual capital budget. The steps to implementing a capital budget include:

- establishing capital improvement policies;
- performing an annual inventory of existing capital assets;
- performing a financial analysis;
- establishing funding sources;
- establishing a capital reconstruction reserve; and
- implementing the annual capital budget.

The exact format of capital improvement policies will vary from utility to utility depending where it fits into the overall municipal organization. All requests for capital improvements should be reviewed by the utility manager and forwarded to the appropriate official.

Capital improvement policies should address criteria for determining what is a capital item. A suggested capitalization policy includes any item which has a cost greater than $700 and a useful life greater than two years. Only major, non-recurring items should be included in the capital program. Examples of capital items include:

- land purchases;
- expanded facility operations; and
- large scale rehabilitation (one that expands capacity or extends useful life).

Replacements of sewer collector lines, if recurring, should be treated as an operating, not capital, expense and provided for as part of the maintenance budget. If, however, the facility rarely receives approval to fund line replacements (i.e., not an annual maintenance expense), then this may be treated as a capital item.

Policies should also address the number of years to be included in the capital program. Normally, a capital program is planned for a five-year period. As each year passes, the second year becomes the first (and is included in the annual budget as the capital budget) and a new fifth year is added to the plan.

Policies should also be established to obtain citizens' input into the capital planning and budgeting process. The utility's plan represents large expenditures which often dramatically affect the community. Obtaining citizen input can gain needed support for the capital plan and budget and for the capital financing mechanism such as bond issues.

The utility should compile and update an annual inventory of its physical plant. For each capital item the inventory should record:

- description, including an identification record;
- original cost;
- modifications;
- funding source;
- year of acquisition;
- condition;
- estimated useful life from acquisition;
- annual depreciation amount; and
- estimated target date for reconstruction or removal.

This information is important in order to provide documentation for the preparation of utility financial statements, compute and support depreciation expense and to forecast replacement needs. This information should be recorded in the utility's fixed asset records. (Refer to Accounting section for a discussion of fixed asset records.)

Financial analysis involves the determination of a utility's capability to secure financing for capital expenditures. This is normally associated with the municipality's financial capability to fund these expenditures. The key to the financial analysis is to determine the amount of capital expenditures that the utility can save or defer until needed. Consideration must be given to:

- smoothing out the tax rate or sewer service charges, i.e., not having major increases/decreases from year to year;

- maintaining a balance between debt service and operating and maintenance expenses;

- staying within debt limits; and
- availability of one-time Federal or state grants/loans for major items.

The utility should consider establishing or expanding the use of a capital replacement reserve as part of its annual capital budget request. The reserve should be thought of as an annual budget item to be raised by taxation or recovered through sewer service charges, connection or availability fees, whether this reserve is actually expended or not. Utilities typically do not have such a replacement reserve established. Accordingly, when a large piece of equipment breaks down unexpectedly (i.e., an aerator or a vacuum filter) there are no available funds to replace the item. A capital replacement reserve provides a needed cushion for such unforeseen, but predictable occurences.

Funding Sources for the capital program should be identified and analyzed as to their impact. (Refer to the Capital Financing section for additional discussion.) Funding sources typically include:

- General obligation bonds which are backed by the municipality's full faith and credit, payment on which is financed normally by property taxes or user fees. These are frequently used when a utility is not recovering its full costs through sewer service charges.
- Special assessment bonds which finance specific projects such as sewer line construction where the project improves the value of adjacent property. Special assessments are levied against the owners of the benefiting property based on the specific benefit accruing to the property. Assessment income is pledged to the repayment of these bonds.
- Revenue bonds which are backed by the income from the utility but are not full faith and credit obligations of the municipality. Charges are made to the users of the sewer system which are then committed to repay these bonds. Revenue bonds are becoming more popular (than general obligation bonds) because:

    1. Utilities are becoming more self-supporting, relying on sewer service charges to finance costs, including capital expenditures;
    2. Municipalities are limited in the amount of taxes they can levy; and
    3. Revenue bonds are not considered part of the general municipal debt and in some instances are issued by the utility without a public vote.

- Federal and state aid which, when available, finances a major portion of the capital expenditure while minimizing the local share of the costs. The utility should be cautious to ensure that Federal and state requirements are met (i.e., instituting a fully recoverable user charge system) and should evaluate the future impact these grants will have upon operating budgets.

In addition to these common funding sources, a number of other sources to finance capital expenditures exist. While not particularly common, these sources are nevertheless becoming more popular and should be reviewed by utility management for inclusion into its financial planning. These sources include:

- Service availability charges which can be levied against non-users of the system to pay in part for the extra capacity of the system built to handle future flow. Many sewer systems are designed to handle the future needs of non-users (i.e., septic tank users) who will or may eventually tie into the system.

- Connection (tap) fees which are designed to recover the costs of connecting new users to the system. These may be based on the marginal costs to provide new users with the service, plus the connection charge, or may be limited to recovering the actual (direct and indirect) connection costs.

- Development tap fees which are based on establishing a set amount of new connections to be paid by real estate developers regardless of whether these connections are actually installed. These fees are negotiated between the utility (or municipality) and a developer(s) and are paid annually for a defined number of years. The intent of development fees is to establish an orderly growth pattern in a community which will facilitate an orderly planning process for capital improvements and, coincidentally, assist in the development of wastewater loading measures.

Service availability charges, connection and tap fees, where imposed, reduce the amount of capital expenditures required to be raised through bonding. Utility managers should review the feasibility of establishing such charges.

The capital program should include a capital reconstruction reserve which is an amount budgeted each year to make replacement necessitated by a breakdown which cannot be specifically identified. This reserve is in addition to specific capital line item requests for plant and equipment items.

An established amount should be budgeted annually and placed in a reserve, regardless if it is spent in any one fiscal year. Guidelines as to how much should be budgeted for the capital reserve can be based on 1-2% of the utility's reconstruction value. For example, if the utility's reconstruction cost is 10 million dollars, the capital reconstruction reserve can be established at $100,000-200,000. This is typically too large an amount to set aside each year. Accordingly, a capital reconstruction reserve fund of $30,000-60,000 per year can be a realistic amount for a utility to establish on an annual basis.

Such a reserve will benefit the utility in two major ways. First, it will provide immediate funds for needed replacements. Second, it will stabilize the amounts of taxes or sewer service charges to be raised from year to year.

Key to implementing the annual capital budget is the extent to which the capital policies have been accepted by the legislative body and the public. Ideally, the legislative body and the public have played a significant role in developing and improving capital policies for the utility At this stage, the approving body should be adopting the capital budget in principle. Nevertheless, utility managers should be prepared to explain the:

- annual capital budget utility policies;
- need for each capital item requested;
- financial plan to pay for each item; and
- impact on the operating budget, tax rate and/or sewer service charges.

In approving the annual capital budget, the legislative authority is not binding itself to the remaining years of the capital improvement plan. Accordingly, utility managers must be prepared to constantly update, review and strategize how to be successful in capital planning.

Flexible Budgets

Generally municipal revenues are independent of their expenditures. Expenditures are financed by general property taxes. Levels of services are generally determined based on an incremental approach; they are based on what was spent last year adjusted for inflation and unusual events. Budgets are typically line item, by department, with little or no activity budgeting and are fixed in terms of their annual appropriations. Wastewater facilities are different. Levels of service are not fixed. Rather, wastewater service levels are determined by wastewater loadings. Increased loadings mean increased wastewater services which in turn mean increased sewer service charges. Wastewater service is dependent on flow and strength considerations, and it is not established, nor can it be controlled by an annual fixed appropriation. Because wastewater expenses (and revenues) fluctuate with changing loadings (flow and strength), the use of fixed appropriations is inappropriate.

Utilities should adopt flexible budgets to plan, control and evaluate wastewater operations. Flexible budgets are based on various predetermined estimated flow and strength loading levels. These budgets include projected expenses and revenues for each estimated service level. For example, a small utility would create flexible budgets for 1 mgd, 1.5 mgd and 2 mgd flow rates. A medium size utility would create flexible budgets for 10, 12 and 15 mgd flow rates, and so on. Each budget would contain required projected expenses and corresponding sewer service charge revenues for each loading level. Actual operating results would be compared with the corresponding budgeted amounts for the loading level actually encountered. This method would provide utility managers with a more sophisticated and appropriate vehicle to plan, control and evaluate their wastewater facility.

Cost of Service

Most communities are experiencing a fiscal crisis of one kind or another.Many states have adopted revenue limitation measures which limit the amount of taxes that can be levied or expenditure caps which freeze expenditures to that amount spent in the prior year or permit a small percentage increase. The magnitude and severity of the fiscal crisis will vary from community to community. Nevertheless, citizens are generally demanding that their local officials rethink the nature and level of governmental services and who will pay for these services.

In the course of reviewing municipal expenditures, local officials are viewing the sewer service charge as an untapped revenue source since, in many instances, sewer service charges do not recover the cost of wastewater activities. In order to establish the appropriate sewer service charge, it is essential that local officials obtain information about the cost of providing watewater services.

Cost of service for a wastewater facility includes all costs, direct and indirect, including depreciation. Refer to Exhibit II-7 for a cost of service checklist. Utility managers should review this checklist to determine if their cost of service is all inclusive.

Once the cost of service is computed, utility managers should analyze the ability of various funding sources to finance the cost of service. (Refer to the Revenue Requirements discussion in the Cost Recovery section for a further discussion.)

Budget Narrative

Utility budgets should contain a budget narrative which describes utility operations, the major assumptions underlying the budget, major issues the legislative body should address, significant changes in the proposed budget from the current year and the impact of the proposed budget in the tax rate or sewer service charges. The narrative is an important element of a successful budget document. A number of different groups (council members, finance committees, town meeting, etc.) will be reviewing utility requests. Frequently, many of these people will have little knowledge of the utility. A narrative is important because it educates the reader of utility operations and requirements and provides input from the utility manager directly to the legislative body.

The narrative should also include a brief description of how citizen input was obtained.

EXHIBIT II-7

COST OF SERVICE CHECKLIST

DESCRIPTION	SOURCE OF INFORMATION
Direct Costs	
Personal Services	Utility Budget
Operating Expenses	Utility Budget
Maintenance Expenses	Utility Budget
Capital Outlay	Utility Budget
Depreciation	Property or Fixed Asset Records
Indirect Costs	
Pensions	Municipal Budget
Insurances	Municipal Budget
Sick Pay	Municipal Budget
Vacation Pay	Municipal Budget
Principal Payments	Municipal Budget
Interest on Debt	Municipal Budget
Overhead	Municipal Budget or Municipal Cost Allocation Plan
Other Considerations	
Capital Reconstruction Reserve	Utility Policy
Contingency	Utility Policy

Budgetary Control

The beginning of a fiscal year sets into motion the implementation of the adopted budget. The approved budget must be entered into the accounting system so that effective accounting control can be established. A designated utility official should be responsible for monitoring the budget during the year. Key elements of a budget control system include:

- reporting actual expenditures against budget;
- instituting procedures to timely adjust budgets; and
- monitoring progress toward the achievement of objectives.

Reporting budget to actual expenditures is one of the most effective ways to control budgets. At least monthly, a report of expenditures made against budget should be prepared. The report structure should correspond to the budget classification structure used in the budget document. Refer to Exhibit II-8 for a sample budget to actual expenditure report. Expenditure data is obtained from the accounting records.

EXHIBIT II-8

WASTEWATER TREATMENT FACILITY

STATEMENT OF BUDGETED AND ACTUAL EXPENDITURES

Account	Budget Appropriation	Actual Expenditures	Encumbrances	Unencumbered Balance

A statement of actual and estimated (budgeted) revenues should also be prepared on a monthly basis. Refer to Exhibit II-9 for an example of this report.

These reports are important to measure utility operations from both the expense and revenue sides. Remember, utility expenses are caused by flow and strength loadings. Expense and revenue data must be reviewed in a timely manner by management. Discrepancies should be resolved immediately.

Periodic budget transfers may be required for various reasons. The utility should adopt a standard transfer procedure and follow it.

Monitoring expenses means enforcing expense controls and ensuring that planned objectives are being carried out. This entails establishing standards and procedures to measure progress toward achieving objectives.

Accounting and Financial Reporting

Accounting is a means of interpreting business activity. Mechanically, accounting may be viewed as a series of transactions stated numerically. The details of individual transactions are first recorded in source documents. These documents are sorted and summarized and become basic entries in accounting journals or other books of original entry. This data is then summarized and posted in condensed form to ledgers. The data is then transferred to financial statements which constitute the real objective of accounting - reports to management and other users on the financial condition and performance of the utility.

Accounting is primarily concerned with the reconciling and reporting of assets, liabilities, equity, expenses and revenues. Many wastewater utilities have been financed for the most part from general property tax revenues. Recently, many wastewater utilities have been required to, or have adopted, the policy of financing activities through user charge revenues. This has resulted in an increasing number of wastewater operations that are operating as enterprises. An important effect of this change in financing is that it has created a need for more accounting information to better serve their informational needs.

This section on accounting and financial reporting recognizes the dual revenue sources of wastewater utilities - general property tax and sewer service charges. This section is designed to address the common need to provide guidance on accounting issues for a self-sustaining utility or a utility that is to become self-sustaining. The primary difference, from the standpoint of the need for accounting alone, lies largely in the accounting for revenues. If revenue is from property taxes, the accounting is relatively simple and the number of entries is relatively small. If, conversely, income is from sewer service charges, each user must have an individual account and the accounting needed for a wastewater utility is comparable to that of a private enterprise.

The use of general property tax revenues to pay for the operation, maintenance and equipment replacement cost of a wastewater utility is restricted by Federal regulation regarding the use of ad valorem tax as a user charge. (See Cost Recovery Section).

EXHIBIT II-9

WASTEWATER TREATMENT FACILITY

STATEMENT OF ACTUAL AND ESTIMATED REVENUES

	Current Month			Year to Date				
Revenue Sources	Estimated	Actual	Over (Under)	Total Estimated	Estimated	Actual	Over (Under)	Balance to Be Collected
Sewer Service Charges								
General Property Taxes								
Federal Grants								
State Grants								
Septic Tank Disposal Fees								
Interest Revenue								
Rents								
Sewer Availability Charges								
Connection Fees								
Development Fees								
Other								
Total Revenue								

Utility managers should review the concepts discussed in this section with accounting officials in their jurisdictions. Topics that will be discussed are:

- Policy
- Relationship to Budget
- Types of Cost
- Accounting Records
- Enterprise Fund Accounting
- Property and Fixed Assets
- Cash Flow
- Financial Reporting

Policy

Wastewater utilities should establish accounting and financial reporting policies which are consistent with sound financial management and their overall objectives. Policies should address full accountability and informational needs. The accounting system should be broad enough to encompass full utility activities. Installing such a system requires establishing the books of account; formulating a plan for gathering required accounting information and forwarding the information through several offices, and determining the number and type of accounts, records and documents.

The utility should adopt policies to provide suitable working quarters, adequate accounting personnel and sufficient working materials and equipment. Arrangements must be made to receive and disburse cash and supplies, to prepare and disburse payroll and vendor payments and for other activities in addition to maintaining the books and files. Accounting personnel should have accounting experience.

A policy should be established for the accounting system to provide required information. The design of the accounting records is a function of the informational needs of a utility. Information needs are determined by utility and municipal management. It is stressed that the determination of what information is required by management is the prime factor for the accounting system to provide responsive data.

A policy should exist to provide a workable operational plan for the accounting system. This is essential for an efficient and effective accounting system. It includes the following working procedures, internal control and employee instructions:

- Working procedures establish the proper flow and documentation of transactions through the accounting system. A procedures manual should exist which establishes lines of authority and responsibility for each position, a chart of accounts for the utility and records necessary to support accounting transactions.

- Internal control establishes a system of checks and balances to ensure that the work of one employee is segregated from that of another, to provide an audit trail for tracking activities and to ensure accuracy. Employees who handle cash receipts, for example, should not maintain the accounts receivable ledger. Purchases should be received by an individual other than the person who placed the order.

- Employee instructions should be given to each employee as to his or her responsibilities and authority.

The accounting system should reflect the various functions performed by the wastewater utility. Accordingly, a policy should exist for the accounting system to record and report on:

- billings to users of the system
- collection of revenues
- expenses including purchases, interest, payrolls and depreciation
- assets including cash, receivables, inventory, property and investments
- liabilities including debt, accounts payable and reserves
- equity by an analysis of assets and liability accounts

Wastewater utilities perform a number of activities. These activities vary depending on the structure and responsibilities of the utility. A policy should exist to account for wastewater activities such as:

- operations
- maintenance
- laborabory
- billing, meter reading and customer service
- monitoring
- general administration

These activities may be further divided into subactivities. For example wastewater operations can be categorized as collection, pumping, preliminary, primary, secondary, tertiary, sludge treatment disposal and general facilities.

The accounting records should record revenue and expense data, including depreciation, by activity.

A policy should exist to establish a chart of accounts which relates to utility management information needs. The chart of accounts provides the framework to capture necessary information and should permit the classification of accounting information to facilitate control of utility assets, liabilities and fund equity, expenses and revenues. It should classify information in at least the same format and level of detail as the budget. Refer to Exhibit II-10 for a sample utility chart of accounts.

A policy should exist to periodically audit utility accounting records and procedures by an independent public accountant.

Exhibit II-10

SAMPLE CHART OF ACCOUNTS

UTILITY

BALANCE SHEET ACCOUNTS

- Assets
  - Cash
  - Accounts Receivable
  - Due from other Funds
  - Prepaid Expenses
  - Materials and Supplies
  - Restricted Assets
  - Equipment
  - Utility Plant
  - Construction in Progress

- Liabilities
  - Accounts Payable
  - Due to other Funds
  - Notes Payable
  - Bonds Payable
  - Customer Deposits
  - Accrued Liabilities

  - Reserves

- Fund Equity
  - Contributions
  - Retained Earnings

ACTIVITY

- Operation
- Maintenance
- Laboratory
- Billing, Reading
- Monitoring
- General

ACCOUNTS

- General Property Tax
- Sewer Service Charges
- Septic Tank Disposal
- Interest on Investments
- Rent
- Sale of Equipment
- Intragovernmental
- Department Billings
- Sewer Availability Charges
- Connection Fees
- Development Fees

- Expenses (Major Objects)
  - Personal Services
  - Operating
  - Maintenance
  - Equipment Replacement
  - Capital Outlay

EXPENSE ACCOUNTS

- Personal Services
- Operating
- Maintenance
- Equipment Replacement
- Capital Outlay

Relationship to Budget

The accounting and budgeting systems should reflect each other. Budgets are made on an annual basis to allocate anticipated revenues for use. The budget serves as a guide for expenditures during the year. The accounting system and the reports it generates can provide utility officials with needed information to evaluate performance. Complete and timely accounting reports covering such matters as financial condition, actual performance against budgeted expenditures and revenues, and the cost of providing specific wastewater activities are critical ingredients to successful management.

Types of Cost

Knowing full costs is essential for sound financial management. The sum of all activity costs (to include all line items) is known as the utility's cost of service.

Wastewater utilities incur a variety of costs for goods and services. As with activities, costs may be recorded at various levels of detail. Line items are normally used to classify the types of goods and services purchased. Expenditures can be classified at a general level, called major objects, such as operating expenses. If additional detail is needed, the major objects may be broken out to individual components called minor objects such as heat, light and power. Utility cost of service includes:

- personal services
- operating expenses
- maintenance expenses
- equipment replacement
- capital outlay
- depreciation
- debt service
    - principal
    - interest
- fringe benefits
    - pensions
    - employee insurance
    - vacation
    - sick leave
    - holiday
- overhead (accounting, payroll, data processing, purchasing, collection, investment costs incurred by the municipality for the wastewater utility, if applicable)
- capital reconstruction reserve (see Budget section)
- contingency funds

Cost of service data is important in setting user fees. See Cost Recovery. For a further discussion of cost of service, see Budget. Refer to Enterprise Fund Accounting for discussion of depreciation.

Accounting Records

Wastewater utilities must maintain adequate accounting records. These include at a minimum:

- Source Documents

  The details of financial transactions are normally described on documents prepared within the utility or from utility vendors. Examples of source documents include: internal documents such as purchase requisitions, purchase orders, receiving reports, time cards and checks and external documents such as vendor packing slips, shipping documents and invoices. These source documents are evidence of original transactions. Source document information is recorded in one of the books of original entry. Once posted, source documents are filed and retained.

- Books of Original Entry

  Books of original entry are accounting journals (or registers) in which accounting transaction information is first recorded. Accounting information is recorded (posted) from the source document to one of the following books of original entry:

  - Cash Receipts Journal which records cash or checks received
  - Cash Disbursements Journal which records payments
  - General Journal which records journal entries.

  In addition to these required journals, a wastewater utility may use payroll, purchase and revenue journals as books of original entry.

- Books of Final Entry

  Books of final entry are the principal accounting records from which financial and management reports are prepared. Accounting information is summarized from the books of original entry and posted to one of the following books of final entry:

  - General ledger which is a comprehensive record of all major utility accounts and contains the current balance of each account.

  - Accounts receivable ledger which records the amount owed to the utility from each user. Separate ledgers may be used to differentiate revenue sources (i.e., sewer service charges, special assessments, connection fees, sewer availability charges, etc.).

  - Property ledger which records additions and deletions of property, plant and equipment.

In addition, payable and operating ledgers may be used in utilities that are too large to record accounts payable and budgetary revenues, appropriations and encumbrances in the general ledger.

Enterprise Fund Accounting

Enterprise funds are used to account for wastewater operations where there is significant potential for financing the utility's operating and maintenance costs through sewer service charges, even if the municipality decides not to finance the service through sewer service charges, or where the utility desires to know its profit or loss. An enterprise fund is designed to gather total costs, including depreciation where applicable, and to indicate the extent to which sewer service charges are sufficient to recover total costs. Where it is determined not to fully recover the total cost of providing wastewater services through sewer service charges, an enterprise fund indicates the amount of subsidy (i.e., general property tax) which must be supplied.

Municipalities must decide to what extent sewer service charges will recover the cost of wastewater operations within Federal regulations regarding user charge systems. This is a policy decision which should not be confused with the decision to account for wastewater activities as an enterprise fund. The characteristics of enterprise fund accounting for wastewater utilities include the following:

- Budgetary Considerations

  Enterprise funds may be operated independently or as part of municipal operations, depending on local legal requirements. Regardless of legal requirements, budgetary control is important to sound financial management. Therefore, the utility should prepare, adopt and monitor an annual budget, even though it is accounted for as an enterprise fund.

- Accounting Treatment

  Enterprise funds are accounted for on the accrual basis. Revenues and expenses are recorded when they are earned or incurred, respectively, regardless when the cash is received or payments are disbursed. Inventory purchases (materials and supplies) are recorded as assets and are expensed as consumed. Property purchases (land, buildings, improvement other than buildings, machinery and equipment) are recorded as assets and are capitalized.

- Revenues and Expenses

  Where sewer service charges account for most utility revenues, municipalities may provide revenues (i.e., general property tax) to be transferred from another fund (i.e., general fund) to the wastewater enterprise fund. Enterprise funds may receive other revenues from rents, sale of equipment or interest on investments.

Enterprise fund expenses include all operating, maintenance and equipment replacement costs, including depreciation.

- Contributions

  Enterprise funds often receive contributions (from the municipality, customers, subdividers, etc.) for start up or capital donations.

- Debt Service

  Debt service is usually accounted for in separate asset accounts usually called "funds." Typical "funds" required in an enterprise fund include a debt service fund, a reserve fund and a contingency fund.

  - Debt service fund is used to account for all interest and principal contributions, accumulations and payments.

  - Reserve fund is a backup fund for payment of matured bonds and interest should the debt service fund not be capable of paying the required amounts.

  - Contingency fund is designed to provide cash for unforeseen operating expenses and provides additional security that the utility will meet its bonded obligations. This fund is sometimes called the emergency repair fund or operating reserve fund.

  These funds are identified as restricted assets and are established when cash is received. Revenue bonds also typically require the establishment of restricted asset accounts.

- Depreciation

  Depreciation is a process which allocates the cost of a fixed asset over its useful life. It is computed using the information contained in the property or fixed asset records. Depreciation expense is not a budgeted item. Depreciation is computed using the information contained in the property or fixed asset records. It should be based on the net book value of an asset using the following formula:

$$\frac{\text{Original Cost}}{\text{Anticipated Useful Life}} = \text{Annual Depreciation Expense}$$

  Utility managers must consider the impact of depreciation expense upon its profit and loss statement and in establishing sewer service fees. The typical utility usually does not include depreciation as an expense. This practice does not provide a true picture of the costs to operate a utility. Some utilities depreciate an asset based upon the net cost, after deducting Federal and state grants. This practice distorts the financial position of the utility and does not reflect the allocation of the original gross cost over the asset's useful life.

Utility managers should not confuse the true depreciation expense calculation with the policy of including depreciation as part of establishing sewer service charges. Cost of service should be computed to include all costs of operating and maintaining the utility, replacing capital items, meeting debt service requirements and depreciation.

Establishing sewer service charges, or user charge systems required of grantees is a policy consideration separate from computing the true cost of the service.

Property and Fixed Asset Records

Maintaining a complete and accurate accounting for fixed assets is essential. Adequate accounting records are important to the protective custody of utility property. The utility is probably the largest capital asset owned by a municipality. The stewardship responsibility involved in safeguarding such a large public investment is of utmost importance to sound financial administration. An accounting of fixed assets is required to prepare accurate utility financial statements and to account for depreciation.

Fixed assets are specific property items that are tangible in nature, have a useful life longer than two years and have a significant value. What constitutes significant value will vary depending on local policy. A suggested policy is to capitalize any item with a cost greater than $700.00.

An adequate fixed asset system for a utility includes:

- classifying and recording fixed assets;
- developing fixed asset control numbers;
- physical tagging of fixed assets;
- inventoring fixed asset inventory annually;
- disposing of fixed assets; and
- providing periodic statements of fixed assets.

See Exhibit II-11 for examples of fixed asset records.

Cash Flow

Cash flow represents an important component of financial management for a wastewater utility. It is the process of managing a utility's cash to ensure timely billing, collection and availability of cash to meet payroll, vendor and debt service payments and to maximize the amount available for investment.

A utility is primarily dependent on either general property tax or sewer service charges to meet its obligations. In the instance where the municipality is providing general property tax revenues and is paying utility obligations, the utility has very little, if any, involvement with managing cash flow. However, where the utility is primarily dependent on sewer service charges to finance its activities, cash flow management is a vital ingredient to sound financial management.

EXHIBIT II-11

FIXED ASSET RECORD

ASSET TAG NO. ____________________

ASSET CLASSIFICATION ____________________

FIXED ASSET LEDGER ACCOUNT NO. ____________________

ASSET DESCRIPTION	VENDOR

Manufacturer's Serial No. ____________________

ACQUISITION DATA

DATE ACQUIRED ____________________

METHOD OF ACQUISITION ____________________

PURCHASE ORDER NO. ____________________

ORIGINAL COST OR APPRAISAL ____________________

TRANSPORTATION COST ____________________

INSTALLATION COST ____________________

OTHER COST/FEES ____________________

TOTAL COST ____________________

LOCATION DATA

1	DATE	OFFICE OR DEPT.
	BUILDING OR OTHER LOCATION	
	RESPONSIBLE OFFICIAL OR OTHER PERSON	
2	DATE	OFFICE OR DEPT.
	BUILDING OR OTHER LOCATION	
	RESPONSIBLE OFFICIAL OR OTHER PERSON	

FUND SOURCE

FUND	AMOUNT	FUND	AMOUNT

DISPOSITION DATA

DATE OF DISPOSITION ____________________

METHOD OF DISPOSITION ____________________

REASON FOR DISPOSITION ____________________

DATE ____________________

ASSET VALUE ____________________

TRADE IN CREDIT OR SALE PRICE ____________________

TAG NO. OF REPLACEMENT ____________________

APPROVAL ____________________

YEAR DEPRECIATION BEGAN: ____________________

ASSET LIFE:

SALVAGE VALUE:

DEPRECIATION METHOD:

DATE	COST	ADDITIONS DELETIONS	ADJUSTED COST	PERIOD DEPREC.	ACCUM. DEPREC.	RESIDUAL VALUE	PHYS. INVENTORY		MAINTENANCE COST		
							CKD.	CONDITION	DATE	REFERENCE	AMOUNT

Elements of a sound cash flow system include the establishment of effective cash information systems, timely billings and collection systems, disbursement procedures and cash budgeting as described below:

- Cash Information Systems

  A cash accounting system should record and report daily receipts. The utility should know its daily cash balance. It should record the beginning daily balance, receipts, disbursements and ending daily balance.

- Timely Billings and Collections

  The development of policies and procedures which bring user charge dollars into the utility as quickly as possible is critical to sound financial management. Periodic, timely billings for wastewater services is critical to ensure the maximum amount of available cash to meet obligations. Regular billings followed by late payment notices and late payment penalties can encourage more prompt payments.

- Disbursement Procedures

  From a cash management standpoint, disbursements should be timed so that they remove cash from the treasury only at the last possible moment while maintaining payment dates. A system of aging payables should be established which will enhance disbursement control. The utility should wherever possible take advantage of vendor discounts.

- Cash Budgeting

  Cash budgeting is concerned with estimating specific dates of receipts and disbursements. It is not budgeting for revenues (billings) and expenditures (obligations). Cash budgeting can make a significant contribution to cash flow. Two major elements of cash budgeting include:

  - preparing an annual cash budget based on historical receipt and disbursements and knowledge of future events,

  - updating the cash budget on a regular basis throughout the fiscal year.

Disbursement information can be obtained from the operating and capital budgets (see Budget) and the purchasing system. Receipt information can be determined from the billing system. Refer to Exhibit II-12 for a sample cash flow results and forecast format.

EXHIBIT II-12

Cash Flow Results and Forecast

Results for______ and Forecast through______

Fund	Results for (Current Month)				Projected for (Each Projected Month)				(Additional Projected Months)		
	Beginning Balance	Receipts	Disburse-ments	Ending Balance	Beginning Balance	Receipts	Disburse-ments	Ending Balance	"	"	"
	$	$	$	$	$	$	$	$	$	$	$
TOTAL-ALL FUNDS	$______	$______	$______	$______	$______	$______	$______	$______	$___	$___	$___

Two basic methods can be used to project cash flow. One is to use bank statements to accumulate prior years' disbursements and receipt history. A second method is to develop a history of the previous three to five years of receipts and disbursements for recurring types of cash flow. Both methods would need to be adjusted for projected wastewater service increases/decreases and resultant expenditures and billings. Inflation should also be factored in.

Cash budgeting is also important to effective cash management because the knowledge of the timing and extent of cash availability allows management to take an informed approach to designing an investment strategy.

Financial Reporting

The primary objective of an accounting system is to provide financial and management reports to management and other users. Utilities should prepare and publish easily understandable financial reports. Three basic utility financial reports are (1) the balance sheet, which shows how much the utility is worth on a certain date, (2) the income (profit and loss) statement, which shows how much the enterprise earned or lost during a certain period and (3) a statement of changes in financial position which describes the source and use of utility working capital. These reflect the essential, minimum data that management must know.

Management should, however, know the value and earnings of each wastewater activity and such information is made available by more detailed accounting.

Other important financial reports are:

- Statement of Actual and Estimated Revenues;
- Summary Statement of Budgeted and Actual Expenditures; and
- Cash Flow Results and Forecasts

Cost Recovery

One major utility objective is to be financially self-supporting. To be financially self-supporting, a utility needs to recover its costs, in full, through a sewer service charge system. (As used in this manual, sewer service charge includes both operation, maintenance and equipment replacement (OM&R) costs and local capital cost (LCC) recovery.) For those facilities financed in part by Federal dollars under the Clean Water Act, the Act requires a utility to recover 100% of its OM&R costs from each user in proportion to use. This portion of the sewer service charge is referred to as the "User Charge". Federal requirements regarding proportionality do not pertain to recovery of LCC. Sound financial management practices also dictate the initiation or expansion of a sewer service charge to:

- reduce the general property tax support of wastewater operations;
- recover costs from those users who caused the costs to be incurred; and
- become self-sustaining.

As more general property tax limitations are passed such as Propositions 13 and 2-1/2 in California and Massachusetts, respectively, the need for a full cost recovery sewer service charge system will become more prevalent. Utility managers may need sewer service charge revenues to survive. And the sewer service charge is the vehicle by which a utility can become self-sustaining.

Despite Federal regulations and the growing recognition of sewer service charges as a sound financial management practice, many utilities do not have a user charge system or, if they have one, it does not:

- recover total operating, maintenance and equipment replacement costs; or
- recover costs in proportion to use.

Accordingly, this section will discuss cost recovery through sewer service charge systems which comply with Federal regulations and sound financial management practices. Key elements which will be addressed are:

- policy
- revenue requirements
- user charge systems
- district assessments

Utility managers can use this section to initiate a sewer service charge system or evaluate and revise their current cost recovery mechanism to fully recover operating, maintenance and capital costs.

Policy

Wastewater treatment utilities should establish cost recovery policies that are consistent with their overall objectives, Federal regulations and sound financial management. Policies should primarily address full cost recovery and the systems necessary to provide requisite information to determine a proper user charge. Policies should be developed by the utility manager as a recommendation to the sewer authority and/or municipality. Once approved they should become an integral part of the utility's community relations program. Suggested items which should be involved in cost recovery policies are discussed below.

In order to achieve the objective of self-sufficiency, a utility must establish a sewer service charge system to recover its operating, and maintenance and capital costs. In addition, where applicable, Federal regulations for construction grants projects require that 100% of the costs to operate, maintain and replace equipment be recovered through user charges and that recovery be based in proportion to use. Therefore, the utility should adopt a policy to establish a user charge system which:

- recovers 100% of OM&R costs and
- recovers costs in proportion to flow and strength (e.g., suspended solids and BOD).

Capital cost recovery is directed at obtaining revenues to pay the annual installment of plant facility construction costs. The utility's share of construction costs is normally financed by bonds which require annual payments to retire the debt. Typically, the annual revenue requirement for the payment of principal and interest is financed by general property tax. Federal regulations do not require (nor do they prohibit) capital costs to be recovered through sewer service charges. State regulations may prohibit or limit capital costs to be recovered through sewer service charges. Utility managers should be aware of state law restrictions on capital cost recovery. A policy should be adopted to finance capital cost recovery through the general property tax or sewer service fees. (Refer to the capital budget discussion in the Budget section for further details.)

Cost recovery must be accomplished in a fair manner. OM&R costs must be recovered in proportion to use from all users. Capital cost should be recovered over the useful life of the structure, equipment or the collection system. A shorter retirement places too much burden on the initial users. A retirement of capital costs longer than the useful life is not fair to future users as they will simultaneously be paying for the original and reconstructed facilities. Consideration must also be given to the available future capacity of the system to handle discharges of residents and businesses who are not presently tied in. Part of the costs to build the utility are directly attributable to future sewer availability. Nonusers should be paying a portion of these costs through a sewer availability charge. Accordingly, a policy should be adopted that recovers operating and maintenance and capital costs from all users, present and future. (Refer to the capital budget discussion in the Budget section for further details.)

Wastewater measurement is critical to assure proportionality of the user charge system. There are many acceptable ways to estimating wastewater flow. Among these are:

- percent of metered water;
- average water consumed during winter months; and

In situations where the flow of water cannot be measured, a number of acceptable ways to establish sewer service charges exist. Among these are:

- size of water connection, and
- number of water fixtures (i.e., toilets, sinks).

A policy should be established to determine how water will be measured to fairly charge users for flow.

Sewage strength is measured in terms of suspended solids and BOD. The utility is required to know the discharge strength for each industrial equivalent for both suspended solids and BOD. Accordingly, the utility should adopt a policy which specifies that industrial equivalents will be periodically tested for strength characteristics.

Federal regulations require that user charge systems be reviewed biennially and revised as needed to recover operating, maintenance and equipment replacement costs. Wastewater operations are constantly changing. Flow and strength characteristics and the costs required to treat wastewater are not static. A policy should be adopted to review sewer service charges annually. Where flow, strength and billings are set by a contract between the utility and municipality and a user or users (i.e., industrial equivalents), efforts should be made to revise the contract to permit annual reviews and necessary adjustments to sewer service charges.

A proper user charge system requires accurate and timely data on flow and strength of the wastewater and on the cost of treatment. It is critical that utility managers understand the importance of management information in order to accurately compute a sewer user charge. Accounting records and procedures should identify, capture and report accurate and timely cost data (see Accounting). Flow and strength data are needed by individual and class users. Thus, utility cost recovery policies should incorporate the need for timely management information.

Revenue Requirements

The wastewater utility revenue requirement is the amount of cash needed to finance utility operations. It is computed utilizing:

- accounting cost of service;
- policies on OM&R cost and capital cost recovery; and
- budget revenue requirements.

The basic formula to compute sewer service charge revenue requirements is:

$$\begin{bmatrix}\text{Cost of}\\ \text{service}\end{bmatrix} - \begin{bmatrix}\text{nonuser}\\ \text{charge revenue}\end{bmatrix} = \begin{bmatrix}\text{revenues to be recovered through}\\ \text{sewer service charges}\end{bmatrix}$$

Each equation component is briefly discussed below.

Cost of service is the amount of operation and maintenance expense and capital expenditures, including depreciation, for wastewater services provided. These costs include: salaries, electricity, chemicals, insurance, fringe benefits, overhead, fuel, vehicles, service lines and equipment. This information is identified, collected and reported by the accounting system (see Accounting).

Wastewater operations are financed by a number of user and nonuser revenue sources (depending upon budget and cost recovery policies), such as:

- general property taxes;
- special assessments;
- Federal and state grants;
- interest on investments;
- septic tank disposal fees;
- landfill fees;
- sewer availability charges;
- tap fees; and
- user charges.

Nonuser charge revenues are deducted from the cost-of-service to derive the revenue requirements to be recovered from sewer service charges. This information is available from the operating and capital budgets (see Budget).

User Charges

User charges are established to recover the revenue requirement from each user or user class in proportion to its use of the system.

User charges should be computed as part of the budgetary process (see Budget) and billed, accounted for and monitored (see Accounting). The revenues are allocated to each user class based on flow (residential) and flow and strength (industrial equivalent). This allocation is based on the OM&R cost-of-service to treat flow and strength characteristics. Where there are only residential users, cost-of-service is directly related to flow.

It is emphasized that a user charge system is not a once a year event. It is a process which is planned, implemented and monitored on a year round basis. It is a time consuming process. Cost separation between OM&R and capital cost, flow and strength data gathering user class identification all take time. Staff or consultant assistance is needed. The approval and implementation process takes additional time. Public notification and educational or awareness programs are necessary and also take time. Time must be devoted to properly address rate increases. Thus, utility managers should be prepared to spend the required time to develop and maintain a proper user charge system.

Regional Charges

Regional Wastewater systems recover costs through charges to user communities. These assessments are based on flow and strength characteristics similar to those previously discussed. Typically, they are annual charges which are paid periodically through the operating year. Regional systems should have the authority to assess more than once a year if the need arises.

If the Regional wastewater treatment system was constructed using Federal funds, there may be a requirement for the individual communities to recover regional charges through a user charge system which is based on user flow and strength characteristics. Regional treatment system and community officials should check with state and Federal wastewater officials to see if this requirement is applicable.

Regional system managers should recognize the potential for limitations. State efforts to reduce tax levy authority or to place a cap on expenditures may potentially include assessment limitations. Regional system managers should meet with state officials to understand the impact any new legislation will have on regional treatment systems.

Capital Financing

Effective management of a wastewater treatment system must include the ability to expand the system as needed in response to community growth, to reconstruct deteriorating facilities and to make other capital improvements to provide optimum levels of wastewater treatment.

This section discusses the methods of raising the capital funds necessary to meet construction costs. The ways in which these costs are ultimately recovered from the users of wastewater systems were discussed in the Cost Recovery section of this chapter.

There are four primary ways to finance capital facilities and equipment including:

- Federal or state grants;
- current revenues and accumulated funds;
- bonded indebtedness; and
- leasing.

Each of these is reviewed in the following section.

Grants

While the future timing and magnitude of grant funds are uncertain, Federal and state funds for wastewater treatment facilities will undoubtedly continue to be available. Thus, while the emphasis in the future is likely to be on wastewater treatment becoming a financially self-supporting operation, the possibilities for obtaining intergovernmental grants to reduce local costs should still be explored.

Prior to a decision to accept grant funds, it should be determined that the facilities thus obtained are indeed a local priority, and that the future local financial implications (operating costs, manpower requirements, etc.) are acceptable.

The Federal government and several of the states provide a variety of grants that may be used for water pollution control facilities.

To suggest the kinds of avenues that exist, aside from the EPA Construction Grants Program, programs sponsored by the following agencies should be explored:

- U.S. Department of Agriculture, Farmers Home Administration (FHA);
- U.S. Department of Commerce, Economic Development Administration (EDA); and
- Department of Housing and Urban Development, Community Development Assistance. 1/

Further information on the availability of Federal funds can be obtained through the Federal Assistance Program Retrieval System (FAPRS) which can be reached by calling (202) 395-3112. This service can provide a list of all Federal assistance funds for water pollution control. Details of amounts available, eligibility and application procedures are also given in the Catalog of Federal Domestic Assistance. 2/

Various states also make available grants for the purpose of wastewater treatment facilities. Space does not permit a cataloging of the different state programs; further information may be obtained from individual state water pollution control or development agencies, municipal leagues and county organizations, and area planning and devlopment commissions.

Current Revenues and Accumulated Funds

In addition to intergovernmental grants, current revenues and accumulated funds can be a source of funds for financing capital facilities. These may be particularly appropriate in the case of established utilities, where there may be substantial cash flows and reserves have been set aside for repair and replacement, and reconstruction the latter frequently being required as a matter of borrowing contracts (see Bond Security Agreement, below).

1/ U.S. Environmental Protection Agency, Federal Financial Assistance for Pollution Prevention and Control. (Washington, D.C.: EPA, Office of Analysis and Evaluation, March 1980). (202) 426-7874.

2/ Available in all public libraries or by writing to the Government Printing Office (Symbol No. COFA), 710 North Capitol Street, Washington, DC 20402. $20.00.

The use of current revenues to finance recurring capital needs of smaller magnitude (certain equipment needs and replacement) is a common practice, and many governments earmark 10 to 15 percent of their revenues for such purposes. Furthermore, certain design and planning activities may be financed from current revenues.

However, most large capital projects require the amassing of large amounts of cash that cannot be assembled from current income. In these situations, the utility or government must typically turn to the capital markets to borrow funds. The alternative of saving funds to make investments is a limited one. In the case of new systems or major expansions, there is little choice, since users cannot be expected to pay fees for services prior to their receiving them. Even in the case of well-established systems, substantial increases in rates much in advance of improvements is not possible. Furthermore, long delays in needed construction have frequently meant higher construction prices that ultimately increase the overall cost burden of the facility.

Bonded Indebtedness

In making the decision to borrow, certain key policy issues should be resolved. The issues involved in a debt policy are briefly outlined below, followed by a presentation of the types of debt that may be undertaken and the mechanisms of debt management. 1/

- Formulating a Debt Policy

  For most governments, debt management involves a complex of factors born out of both practical necessity and legal tradition. A "debt policy" as such is seldom found in a particular document or set of principles, and the financial planner must take into consideration several factors in policy formulation. First, debt sold today must be repaid in the future and with interest. This will create an added fixed obligation in subsequent budgets. Furthermore, according to both practice and law, most long-term borrowing is done for purposes of financing long-lived, major capital projects. These projects become part of the public physical environment and thereby influence patterns of growth and generate future operating expenditure requirements.

1/ For more detailed information on debt policy and management, see David S. Sawicki et al., Financing and Pricing for Capital Costs of Sewerage Facilities (University of Wisconsin: Milwaukee School of Architecture and Urban Planning, June 1980); Government Finance Research Center, Debt Management Handbook for Small Cities and Other Governmental Units (Chicago: Municipal Finance Officers Association: Chicago, 1978; and Fundamentals of Municipal Bonds. Securities Industry Corporation, New York, 1981.

Debt management policies and issuing procedures should meet four requirements:

- guidelines as to the appropriate and prudent uses of borrowing;
- statutory and constitutional requirements placed upon the use of debt;
- analysis as to the affordability of debt in terms of the fiscal capacity of the issuer; and
- consideration of questions of timing and design to maximize the efficiency of borrowing under various market conditions.

- Uses of Debt

Most borrowing is done to finance capital facilities. This is true not only because of restrictions on the use of public debt, but also because capital facility financing possesses certain attributes that make the use of credit efficient and equitable. Capital investments are those whose useful lives exceed more than one period and, therefore, whose benefits accrue over time. Because large amounts of cash are needed and the benefits will extend over many years, borrowing may be the only feasible alternative for major capital projects.

The need for borrowing to finance public facilities may be particularly great in growing areas. Growth in population and income almost always require capital outlays that anticipate the ultimate growth in revenues. Thus, exclusive reliance on the "pay-as-you-go" approach to finance capital investments out of current savings can inhibit the economical growth of a utility and deter the efficiency of capital investment.

Overall debt policy must be meshed clearly with growth planning and a prudent concept of what the fiscal and economic capacity of the debtor will be in the future. It should be integrated with the process of capital programming and budgeting. Making commitments to carry out specific projects necessarily involves planning for their financing. If the capital improvements program is to be an effective guide for financial planning and a means of achieving a government's long-range physical, social and economic goals, then the capital planning and budgeting process should connect all projects systematically.

- Types of Borrowing

There are two basic choices that must be made at the outset of a borrowing decision: the type of security and its maturity.

General Obligation vs. Revenue Bonds. The securities market is sensitive to the difference among the security types. Given a level of indebtedness, the broader the security base in terms of potential revenues to repay the obligation, the better the market will treat the security.

With general obligation debt (G.O.), the general taxing power of the jurisdiction is pledged to pay both principal and interest. To sell such debt, voter approval may be required, and various debt and tax limitations usually restrict its use.

Various types of limited obligations, known as Revenue Bonds, frequently are sold for purposes, such as water and sewer systems, that produce revenues. Such bonds usually are not included in debt limits, as are general obligation bonds, nor do they usually require voter approval because they are not backed by the full faith and credit of the local jurisdiction, but rather are repaid from various service charges or fees.

Generally speaking, tax-supported general obligation debt is considered a superior form of debt by the market because of its standing as a full-faith obligation of the unit. It typically carries a lower interest rate than revenue-secured debt. There are many circumstances, however, where revenue-secured debt has advantages, particularly when it comes to allocating the costs of facilities to the actual users. A frequent reason for using the revenue bond (and associated special-purpose funds or districts) has been to circumvent debt and referendum requirements or to finance purposes that are beyond the legal authority of a general unit of government.

Long-Term vs. Short-Term Borrowing. Another important choice in security type is between long-term borrowing (that which extends beyond a year) and short-term borrowing (that with a maturity of a year or less).

There are three types of short-term debt: (1) the bond anticipation note, which anticipates the ultimate sale of the long-term bond; (2) the tax anticipation note, which is sold to bridge gaps between expenditures and expected tax proceeds; and (3) revenue anticipation notes, short-term securities that are sold in anticipation of general revenues or grant receipts.

- Designing a Bond Issue

The features to be determined in designing an issue include the two major characteristics previously described: length of term; and the type of security pledged.

In addition, other major aspects must be determined:

- Denomination. This is the face amount (or par value) that the issuer promises to pay on the date the bond matures. Five thousand dollars ($5000) is the standard denomination for larger issues.

- Registration. A registration option may be offered, in which case the owner's name is listed in the books of both the bond issuer and the paying agent. Registration may be offered for principal and interest or only principal.

- Call privileges. A bond that is callable may be retired before the maturity date. Usually this feature is considered when interest rates are high.

- Coupon. The coupon is the detachable part of a bond which serves as a notice of interest due. If the bond is registered (see above) checks are issued automatically by the issuer to the holder. Otherwise, the holder presents the coupon for payment. Nominal rates of interest are specified on the coupons. The rates may vary (if state law permits) depending on length of maturity. The establishment of rates and the number to permit should be done in conjunction with the fiscal advisor.

- Method of retirement (Maturity structure). Serial bonds are divided into amounts which mature annually. Maturity schedules are of three types:

  (1) Declining payments (principal matures in equal payments and interest is paid on declining balance;

  (2) Equal payments - annual principal and interest payments are approximately equal; and

  (3) Irregular payments - designed to accommodate the financial situation of the local government.

Term bonds are retired at maturity (or at specified dates during their life) from sinking funds accumulated during the life of the bonds. Term bonds are not popular because of the potential for diverting sinking funds to other local uses.

- Bond Security Agreement for Limited Liability Bonds

Limited liability bonds, because they rely on restricted funds, are subject to special agreement between the debtor and the creditor. This agreement (known as the trust indenture) includes a requirement that bond funds be held in a special fund in order to guarantee that the funds are kept separate from operating funds. The manner in which the bond funds may be used and how operating income from the facility should be handled are spelled out in the trust indenture in great detail.

In addition, a variety of special pledges or covenants may be included in the agreement. One of these should pledge that the rates for users of the facility will be kept at a level that is sufficient to pay debt service and to operate the system. Such covenants usually require an enterprise system of accounting which is helpful in encouraging a self-supporting operation of the facility.

- Marketing Debt

Debt may be issued either through negotiation with a purchaser or by competitive bidding. The latter is usually required in the case of general obligation borrowings. In this case for the public sale of bonds, the following steps should be taken in preparing the bonds for sale:

- Prepare documents for the bond sale. These include:

  - the official statement,
  - the official bid form,
  - the security agreement (see above), and
  - the bond sale calendar.

  Note, the option to refuse all bids should be maintained.

- Obtain a bond rating. A rating can be obtained for a fee from either Moody's Investors Service or Standard and Poor's Corporation. A rating expresses an opinion about the quality of a bond and the risk for the investor.

- Choose the date of sale. This should be done with fiscal experts so as to obtain the lowest possible rates.

- Advertise the bonds in the *Daily Bond Buyer*, local newspapers, financial journals and by direct notification of investment banking firms.

- Award bids. All bids that do not meet the terms of the sale should be discarded. The award is made in conjunction with bond counsel and fiscal advisor, and good faith checks returned to unsuccessful bidders.

- Print bonds. Instructions to the printer should include the number to be left blank, the number needed to be registered, and the delivery date.

- Bond closing. At closing, the fiscal advisor will verify final closing figures. Debt records are provided to the paying agent and the bond issuer.

Several states also offer credit assistance that may be of the following types:

- Guarantees - state acts as guarantor with a contingent obligation to the bond holder in the event of default.

- Financial intermediation - state sets up a special entity such as a bond bank which pools small issues or a development authority in which the state borrows and then lends to localities.

- Using Advisors

Borrowing frequently involves the needs for specialized skills that are not found on most government staffs. Communities may need to obtain assistance in issuing debt from the following types of advisors:

- Fiscal Advisor - these experts put the financing package together. They should have a thorough knowledge of the legal framework of the jurisdiction, the workings of bond and money markets and how to obtain a bond rating. A fiscal advisor can:

  - help obtain public support for a referendum,
  - prepare a financing plan, and
  - design the features of a bond issue.

  Sometimes these services are provided by engineering firms or architects, which may also be independently hired.

- Bond Counsel - has principal responsibility to the investor. The counsel's duties typically are to:

  - determine whether there is legal authority to issue debt,
  - draft bond ordinance, resolutions, or trust indenture, and
  - determine if bonds are legally advertised, sold and executed.

- Local Attorney - in cases where bonds will be sold locally or are placed privately, the local attorney may fulfill functions of a bond counsel. Even when bond counsel is retained, a local attorney may be used to review the documents prepared by bond counsel.

- Outside Auditor - the official statement of the bond offering should contain audited financial statements of the issuing agency. The auditor should be independent and give an opinion that the material financial statements are correctly prepared and presented.

- Underwriter - in many types of bond sales the underwriter (who buys the debt for purposes of resale to investors) may also perform financial advisory services.

- Paying Agent - the paying agent is usually a bank, selected in a financial center, who handles transactions with investors, such as remitting coupon (interest) payments and the retirement of principal. State laws frequently govern selection of paying agents.

- Innovations in the Bond Market

As the cost and complexity of borrowing has increased, public officials have looked for nontraditional ways to borrow funds. One technique which has drawn considerable attention is the new directly marketed small-denomination bond. This credit instrument, commonly referred to as a mini bond, has been used in several jurisdictions to raise modest amounts of capital (less than $1,000,000) at relatively lower interest and administrative costs. 1/

Whereas the traditional tax-exempt bond is sold in denominations of $5,000 or more, the mini bond may range from $100 to $1,000 and is sold directly to investors, bypassing the underwriting establishment. The fascination local officials have with mini bonds does not relate to their ability to acquire funds previously unavailable through normal channels. Rather, they see the mini bond as a way to provide a tax-free yield to citizens typically excluded from the bond market who could benefit from a tax shelter. And they present the opportunity for a unique form of citizen participation; thus encouraging a sense of civic pride and ownership. For example, Rochester, New York, first sold mini bonds in 1979 for an industrial park, downtown improvements, and public safety communications.

Another attraction public officials have recognized is the reduction in the total cost of issuing this type of security over the more traditional forms. Savings, though difficult to quantify, occur for two reasons: (1) interest rates should reflect the elimination of underwriting and brokerage fees, and (2) coupons are eliminated by selling discount bonds or using machine-readable checks which reduce debt service costs.

Early experiences with the sale of mini bonds suggest there may be extra expenses for printing costs and selling the bonds directly to investors from City Hall offices. However, the additional expenses do not outweigh savings and are expected to decrease as familiarity with the process increases.

Those who criticize this method of debt issuance raise some important issues. First, they argue that there is a tendency to overprice the mini bonds compared to market interest rates. They also point to the lack of a secondary market where mini bond purchasers can sell the bonds and the inappropriateness of the tax shelter for some mini bond purchasers.

1/ For a more detailed discussion on mini bonds see Edward Anthony Lehan, "The Case for Directly Marketed Small-Denomination Bonds," Governmental Finance 9 (September 1980): 3-7.

Despite these drawbacks, several local jurisdictions and the state of Massachusetts have successfully sold these citizen subscription bonds. Some issues which must be considered by local governments planning to sell mini bonds include:

- whether a rating agency review should be obtained;
- what the issuing officials' disclosure responsibilities are;
- how rates will be set in the absence of competitive bidding;
- whether the jurisdiction will "create" a secondary market; and
- how the mini bond will be designed with respect to the denomination, technique of interest payment, form of ownership, and maturity.

While this bond market innovation receives strong and enthusiastic support from local officials who have raised capital with mini bonds, many bond market experts are not quite as supportive. Therefore, jurisdictions interested in this method of financing will encounter substantial resistance from the finance community. However, in the face of diminishing Federal grant assistance, this technique may satisfy a financial need, and perhaps more importantly, encourage citizen support for needed wastewater treatment facilities and equipment.

Leasing

Leasing is one of the least used techniques for financing wastewater treatment facilities, yet potentially one of the most useful. For municipalities faced with inflation, declining revenues, and legally imposed bonding limits, leasing offers a prompt, flexible, and oftentimes cost-effective alternative to issuing debt. A number of municipalities, both large and small, have arranged for the lease or lease-purchase of wastewater facilities and/or major equipment. In discussing the leasing option, this section examines:

(1) principal types of leases;

(2) legal, practical and financial advantages of leasing; and

(3) examples from local governments that have employed this financing technique.

• Principal Types of Leases

A lease is defined as a legal and financial instrument which permits a lessee to use an asset (equipment or a building) in return for regularly scheduled payments to the owner.

The option to purchase upon completion of the lease is often written into the contract. Because municipalities cannot obligate themselves for debt beyond the annual appropriation cycle, municipal leases typically include a "fiscal funding" or "non-appropriation clause" allowing the municipality to terminate, without penalty, a lease for which funds are not appropriated.

The two principle lease arrangements used when governments act as a lessee are the straight-operating lease and lease-purchase agreement. The straight-operating lease is simple to structure for both parties. Terms and rental fees provide little room for negotiations because the vendor expects to receive fair market value for the asset when leasing payments are completed. The rent paid by the municipality includes no interest and the contract does not allow for a purchase option. A straight-operating lease frequently is used when a government does not have sufficient funds to purchase an asset because of budget constraints or grant requirements. Many cities now lease the following major items: fire trucks, garbage trucks, police and ambulance vehicles, administrative equipment, and road maintenance equipment.

Historically, leases of this type were arranged for periods of 5-10 years, thus reserving the number and size of bond offerings for large capital facilities, such as new building construction. In most lease arrangements, the initial cost of the equipment is borne by the lessor, with the term of the lease coinciding with the projected life of the equipment and with the cost amortized over the same period.

While a lease involves only rental payments, a lease-purchase agreement is structured with an option to buy when the terms of the lease have been completed. Although title for the asset generally remains with the lessor, the municipality accumulates equity with each rent payment.

Lease and lease-purchase agreements can be arranged either directly from a vendor or from a lease-financing company. The difference between the two is that a lease-financing company can be used for any brand or type of equipment or facility desired, whereas the vendor can only arrange leasing of its own line of goods. A lease-purchase agreement may also be structured as a tax-exempt lease through a bank or other financial institution rather than as a lease arranged directly from a vendor or third party corporation. The lease, lease-purchase, and tax-exempt lease agreements offer a range of tax advantages to the lessor, lessee and investor which are examined in more detail in the following section.

- Advantages of Leasing

Properly structured, a lease or lease-purchase agreement is often a more efficient and less expensive method to obtain the use of equipment than a traditional bond issue or outright purchase. Municipalities have identified the following legal, practical, and financial advantages that leasing may provide.

Legal

- lease financing is not subject to legally established debt limits,
- municipalities are not required to hold a referendum before entering into a lease agreement,
- the required "fiscal constraint" clause obligates a municipality only on a year-to-year basis.

All three advantages evolve from the principle of common law that holds a lease is not a debt and, therefore, is not subject to established debt limits or to legal procedures for issuing additional debt.

Practical

- leases may be used for equipment too small to justify a bond issue, but too large to finance out of current revenues,
- lease repayment schedules are designed to match municipal budgets or revenues,
- through leases all normal warranties and guarantees of the manufacturer are passed through to the municipality,
- lease contract terms fall within existing laws and appropriations and are frequently very flexible.

Financial

The lease, lease-purchase agreement, and tax-exempt lease each offer tax benefits to the various parties involved.

A straight-operating lease establishes rent payments only for use of the asset and does not include interest. The lessor, or owner, may take advantage of depreciation allowances but tax-free interest benefits do not apply.

A lease-purchase agreement, by contract, includes a schedule of both principal and interest on the principal balance of the purchase price of the property. The lessor benefits from receiving tax-free interest as part of the scheduled lease payments. The municipal lessee or renter benefits because the tax-free incentive brings leasing interest rates in line with the municipal bond market.

The tax-free lease is a lease-purchase agreement in which the municipality borrows the purchase price from a bank or other financial institution. Title is transferred to the institution which has loaned out money to the municipality. After the manufacturer has assigned its rights in the lease to the financial institution for cash, its only obligation is to honor applicable warranties.

While the tax-exempt lease benefits the manufacturer through immediate payment, no depreciation or tax-free interest is available. The municipality benefits by negotiating an interest rate comparable to that in the municipal bond market. The bank or financial institution frequently sells certificates of participation in the municipality's lease payments to investors, the interest of which is tax-free.

In all three cases, investment tax credit is not available to the manufacturer, vendor, or other lease holders because the property is used in conducting the business of municipal government.

- Bond vs. Lease Financing. The fact that leasing may prove to be the least expensive means of equipment financing requires further explanation. This statement refers to comparable costs of bond financing or outright cash payment for equipment which costs from $50,000 to $2 million. Actual experience of municipal officials and various analyses uphold this view. The interest rates on borrowing via a bond issue will typically be less than the interest costs involved in a lease. However, bond issues involve many other costs than simply the stated rate of interest, including the costs of holding a referendum, underwriting fees, closing costs, legal fees, tax opinions, printing and engraving expenses, special bidding procedures, and possibly state approval. When these are calculated, leasing, even at a slightly increased interest rate (owing primarily to the higher risk involved for the lessor should a government be unable to appropriate the annual lease payments) often can come out ahead. The example in Exhibit IV-13 compares the total costs of a $100,000 piece of equipment when financed by either a 10-year bond issue yielding 8.5 percent annually and by a 5-year lease at 10 percent annual interest.

EXHIBIT II-13

BOND vs. LEASE FINANCING

	ISSUE A BOND	ARRANGE A LOAN
Equipment Cost.	$100,000	$100,000
Total Interest Expense.	48,783	27,482
Other Expenses: (estimates)		
Referendum	1,000	---
Legal.	2,000	---
Financial.	2,000	---
Printing	1,000	---
TOTAL COST.	$154,783	$127,482
Assumptions:		
Life of Equipment.	5 years	5 years
Length of Financing.	10 years	5 years
Interest Rate.	8.5 percent	10 percent

Another factor can be the "inflation delay" costs between the time the decision is made to acquire capital equipment and the receipt of funds from the bond sale. With leasing, the equipment can be made available almost immediately and thus there are few "inflation delay" costs associated with this method of acquisition. Expenses to the municipality associated with leasing include the higher interest rate plus administrative time involved in negotiating the lease contract. However, the total costs associated with the lease for the municipality will likely be less than bond financing on a present value basis because the lease term will be for a shorter time period.

- Purchase vs. Lease Financing. Exhibit II-13 shows that the present value of lease payments for a $100,000 piece of equipment are virtually the same as the cost of purchasing when calculated at a 9 percent discount rate over 4 years.

EXHIBIT II-13

	PURCHASE		LEASE	
YEAR	Equipment Cost	Present Value of Cash Flow	Annual Lease	Present Value of Cash Flow
0 (current year)	$100,000	$100,000	$ 25,498	$23,393
1		---	25,496	21,459
2		---	25,496	19,688
3		---	25,496	18,062
4		---	25,496	16,571
TOTAL	$100,000	$100,000	$127,482	$99,173

While the present value discount factor is assumed to be 9% for the example, the exact rate for each local government will be different. The discount factor is the borrowing cost (or cost of capital) for a particular city, which for simplicity is assumed to be the cost of issuing debt.

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The execution of a lease-purchase contract by a municipality is much simpler than obtaining bond financing. First, depending on the jurisdiction, it may not require competitive bidding and may be done solely on a negotiated basis. The lease document can be in a standard lease format and (except for the "fiscal funding" clause) accompanied by:

- an amortization schedule indicating the payment allocation to principal and interest;
- a certificate of authorization approved by the governing body of the jurisdiction; and
- a legal opinion of the municipal attorney.

The municipality holds title to the equipment subject to the lessor's lien and is responsible for insurance, taxes, and all risks associated with ownership until clear title passes to it at the end of the lease term.

While leasing offers a number of attractive features, municipalities are advised to consider the following issues before entering into any leasing agreement:

- compliance with public bidding laws,
- state as well as local debt limit provisions,
- required collateral for rent payments,
- consequences of nonappropriation of lease payments by the municipality,
- impact of "non-substitution" clause which prevents the municipality from purchasing, through another source, the asset that is being leased, and
- probable tightening of municipal lease and lease-purchase accounting standards to eliminate excessive off-balance-sheet financing.

- Lease-Purchase Examples

While lease-purchase agreements are relatively new to the field of wastewater treatment, cities and towns of various sizes have used them to their advantage.

In 1978, a major Eastern city was ordered to phase out ocean disposal of municipal wastewater immediately. After city engineers drew up preliminary requirements for the sludge treatment facilities, the project was put out for bid on a lease-purchase basis rather than seeking a bond issue. Although the city did not have the necessary capital, the lease-purchase arrangement was chosen over a possible bond issue principally because of the time factor rather than fiscal constraints. The city director for water pollution control estimates that if normal planning, testing, bidding, and approval procedures had been followed, ten years or more would have elapsed.

Facilities and equipment were built on a turn-key basis, with the city making its first payment only after the facility and equipment were completed, and installed, and performance standards met. The contractor continued to supply training, chemicals, and other than base-line maintenance during the two-year leasing period. To date, this city has purchased two facilities and three dewatering machines through lease-purchase contracts. The pollution control director identified the following advantages of leasing over capital budgeting:

- there is no risk of the failure or delays associated with bond issues;
- only serious competitors make bids since contractors must invest money up front for completion of the entire project;
- the city need not purchase equipment and facilities that do not meet standards established in the contract;
- the contractor, not the city, is under pressure to complete the facility on schedule so that leasing payments may begin; and
- lease-purchase agreements are competitively priced when all the costs related to a bond issue are calculated.

For years, a small midwestern town maintained a flat rate for all residents using municipal water. In 1974, the Town Council decided to install meters, but did not have the capital to purchase the 400 or more that were required. Working with a private leasing company, the town arranged for a five-year, lease-purchase agreement for meters with a projected life of 20 years. Within three years, the added income from the metered water helped the city pay off the remaining $10,000 to complete its purchase. Town officials report that the meters have continued to give good service and water rates have remained acceptable to residents at $.70 per 1000 gallons.

A municipal utility district, serving one of California's major cities has used leasing to insure the adequacy of equipment before purchase. While this district has been able to finance all necessary facility and equipment requirements through bond issues, grants, and sewer service charges, utility managers recently leased a major sludge treatment unit on a six-month trial basis before deciding to purchase. The district was able to apply 80 percent of its rental fees towards the purchase price. The utility's purchasing agent sees an expanded use of leases even by those districts for which a bond issue is feasible. With wastewater technology advancing so swiftly, particularly in secondary treatment processes, he believes that municipalities may be well advised to lease equipment affected by rapidly changing technology, rather than financing over the traditional 15 to 20-year period.

Leased facilities and equipment are available through third party leasing corporations and increasingly from manufacturers. In some instances maintenance, supplies and even skilled personnel are available through these same parties.

PUBLIC INVOLVEMENT--A TOOL FOR IMPROVING OPERATION AND MANAGEMENT

"Treatment plants out of compliance!". "Sewer rates through the roof!". "Residents fight sludge disposal site!". These are the kinds of headlines that haunt public officials who are responsible for operation and management of wastewater treatment systems. Public works officials are, unfortunately, rarely the recipients of public service awards. They are, in fact, more likely to be the target of community ire--an experience which may only lead to a desire to avoid public involvement at all costs. The paradox is that community support for sufficient personnel and funds is vital for improving operation and management. And that support will, more than likely, only come after a concerted effort by public officials to involve and educate the public. The challenge, then, is how to win over a community, how to obtain support for adequate funding, and how to resolve the political issues that can contribute to inadequate operation or management.

Involving citizens--even when not mandated--can be politically prudent. It can:

- enhance public understanding of an issue;
- ensure adequate funding;
- ensure reasonable costs;
- reduce conflicts;
- improve public appreciation of the ability and actions of government officials; and
- avoid undesirable social, economic or environmental impacts.

Involving citizens can also provide valuable information and ideas for making decisions about management improvements. It can:

- identify community opinions and interests;
- define community issues; and
- develop sound solutions that are acceptable to the community.

In seeking adequate funds for system management, a community's wastewater system may, unless operated as a self-supporting utility, be in direct competition with other government programs. Adequate financing may hinge on obtaining a larger slice of the revenue pie--or it may be necessary to enlarge the pie. Neither of those approaches will happen without public support, however. It is also possible to consider treatment systems as a community resource that might have value for other government programs. Citizens who are involved in considering the range of government programs and funding demands may very well come up with creative approaches that maximize the uses of wastewater treatment facilities.[1] For instance, a plant site or sewer easement might be viewed as a resource for recreational or educational use. Furthermore, with access to the site and its waterfront areas, the general public is much more likely to care about the effectiveness of plant operations.

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[1] Alternative approaches that have been used across the country are described in "Recreation and Land Use: The Public Benefits of Clean Waters." EPA, Office of Environmental Review, Washington, DC. 1980. See also, "Environmental Quality, the Eleventh Annual Report". Council on Environmental Quality, Washington, DC. 1981.

Community involvement, as operators of other government programs have found, may or may not arise of its own accord. To receive the full benefit from public involvement, local officials will probably have to take a leading role in encouraging residents to be involved in the task of overcoming stumbling blocks to proper system management. However, to be effective it is necessary that local officials understand how to plan to involve the right people at the right time in the right activities.

Table 1 gives suggestions for some "dos and don'ts" of public involvement. The remainder of this section focuses on the reasons for involving the public, the potential benefits of so doing and describes how public involvement can be accomplished in a manner that will achieve the desired purposes. Table 2 summarizes the questions that should be addressed when planning for public involvement.

Why Involve the Public in Wastewater Utility Management?

Public officials are, unfortunately, most often aware of the negative aspects of civic activity - lawsuits, lobbying, and demonstrations or picketing by irate citizens. They are already familiar with the citizen participation requirements that accompany many Federal assistance programs. Too often, public officials have experienced citizen participation in those programs that is ineffectual and have not experienced the benefits that can occur when citizens and public officials work together for common goals. Nonetheless, the time invested by municipal officials in putting together an effective approach to public involvement can indeed have a multitude of benefits--not the least of which can be vital community and political support so that adequate financing becomes the norm. The fact that when no Federal funding is provided, public involvement is not required should not mean that its benefits can be overlooked.

The residents of any community have a substantial investment through their local and Federal tax dollars in wastewater treatment. Citizens, therefore, have a strong material interest in protecting this investment and making sure that it is used as efficiently as possible for as long as possible. Furthermore, wastewater treatment is essential to any community and how a treatment system is operated can significantly enhance or degrade a local environment. Many communities have discovered that wastewater treatment planning decisions have long-lasting economic, social and environmental repercussions in their community. For these and other reasons, it should be fairly easy to stimulate citizen interest in operation and management--and once stimulated to channel it in productive directions. Establishment of a continuing public involvement program can also be particularly useful in highly transient areas by setting up a mechanism that reaches out to new residents

TABLE I

THE DO'S AND DONT'S OF PUBLIC INVOLVEMENT

DO	DON'T
Define objectives of an activity	Have a "hidden agenda" for public involvement
Have all parties involved agree on objectives	Make decisions immediately following a public meeting
Use an approach that matches: -the stage of development of an issue -the technical complexity of an issue -the "public" who is involved	Permit special interests or vocal minorities to dominate public meetings or advisory groups
Tie public involvement to key issues	Place too many demands on individual citizens (volunteers are busy people - their time is valuable)
Provide adequate time for the public involvement approach used	Address the wrong issue or allow involvement to get side-tracked on extraneous issues
Provide a definite completion date for activities	Launch a public involvement campaign without consent of elected officials
Use a politically acceptable approach or lay groundwork	Rely solely on "legal notices" to announce public hearings or meetings
Give adequate notification time for public hearings and meetings	Rely on advisory groups as the only technique of public involvement
Precede public hearings with public information programs	Announce a public hearing without providing prior public information on the issue
Include participants from all groups affected by issue or decision	Become too friendly with any one segment of the community
Give citizen groups well-defined charge with deadlines for tasks	Talk down to citizens as "only" lay people
Provide adequate guidance and staff support to citizen groups	Don't neglect to involve professional and business persons from a broad spectrum of the community
Present technical material concisely and clearly	
Provide citizens with feedback that shows that their input was indeed considered	
Keep elected officials informed of developing issues and problems	
Get to know your community leaders	
Reach out to the total community including uninvolved citizens	
Be creative	
Listen	

and thus maintains a level of appreciation for the system despite high community turnover.

One long-term benefit of public involvement is likely to come from the resultant core of informed citizens with a continuing and long-term interest in advocating proper management and adequate financing in the face of changing political players and climates. In addition, concerned citizens can play a unique role by taking the lead in advocating actions that might otherwise be avoided by public officials who are concerned with political expediency. Public officials who want to elevate the priority on the local agenda for improving system management will find that informed and supportive citizens are invaluable allies.

TABLE 2

QUESTIONS TO ANSWER IN DEVELOPING A PUBLIC INVOLVEMENT PROGRAM

WHEN SHOULD PUBLIC INVOLVEMENT BE USED?

- to clarify or develop an issue
- to define problems
- to articulate goals
- to develop alternative solutions
- to recommend a preferred alternative
- to advocate a course of action
- to monitor implementation

WHAT ARE THE OBJECTIVES OF PUBLIC INVOLVEMENT?

- to fulfill legal requirements for public hearings or referenda
- to be politically prudent:
  - to enhance public understanding
  - to ensure adequate funding
  - to ensure reasonable costs
  - to reduce conflicts
  - to improve public appreciation for government ability/actions
  - to develop solutions acceptable to the community
  - to avoid undesirable social, economic or environmental impacts
- to gather information:
  - to identify community characteristics
  - to identify community opinions and interests
  - to define community issues

WHO SHOULD BE INVOLVED?

- the media
- elected officials
- private citizens - the general public
- affected citizens - client groups, citizens or businesses with an economic interest in the issue
- experts and agency staff
- organized citizens - civic groups

WHAT RESOURCES ARE AVAILABLE FOR PUBLIC INVOLVEMENT?

- time:
  - how much staff time can be given to managing public involvement
  - how much time is available to achieve objectives of involvement
  - how much time can the public to be involved be asked to spend
- funds:
  - how much money is available to spend on public involvement activities
- special talent:
  - what leadership role can be expected of public to be involved
  - what special skills are available in the community
  - what skills do staff who will manage public involvement have
- what are the available community communications networks

WHO WILL MANAGE PUBLIC INVOLVEMENT?

- who will be responsible for responding to public involvement
- which staff person should be the contact for the public
- what are other public involvement activities of the local government
- what skills are required

WHAT TECHNIQUES (OR COMBINATION OF TECHNIQUES) SHOULD BE USED?

- information giving
- information receiving
- targeted to a broad "public"
- targeted to specific narrow segments of the public
- formal public involvement efforts
- informal public involvement activities

There are several knotty problems peculiar to wastewater system management for which an active involvement of the public in devising and effecting solutions could have a salutory effect. Some of these are listed below; however, this list is not all-inclusive--any problem may well benefit by the better definition that can come from citizen involvement and the range of solutions that are considered is likely to be broader and more creative if the public is involved in developing options.

Suggestions of areas where public involvement could be helpful include:

- inadequate financing;
- rate setting;
- capital replacement;
- extension of services;
- sludge disposal;
- industrial wastes; and
- interjurisdictional disputes.

Inadequate Financing

An inadequate budget can cripple the management of a wastewater treatment system. When public funds are tight, there is always a strong temptation to take a shortsighted approach by cutting out funds for the purchase of replacement parts or equipment. Without adequate funds it may be impossible to hire sufficient personnel to provide adequate training or to establish efficient maintenance or inspection schedules. Citizens who are concerned about the wise use of public money and who understand the long- and short-range environmental problems that occur as a result of an inadequately managed system can take the steps necessary (even if at first glance it may seem politically difficult) to ensure that adequate funds are provided.

Rate Setting

Sewer rates have hit the headlines with increasing frequency during the past few years and increases have met with resistance (and even demonstrations) in some locations. Citizens who are convinced of the importance of protecting their investment in wastewater facilities with adequate funds for operation and management and who are consulted in designing the structure of sewer rates can be a positive force in mitigating the public reaction to rate increases. If indeed rates are found to be overly burdensome, then citizens can provide insights and suggestions for alternative courses of action. In any event, citizen involvement will guarantee that equity considerations are addressed.

Capital Reconstruction and Renewal

Careful stewardship of wastewater system facilities can lengthen their useful life--but not indefinitely. At some point each piece of equipment, pipe or plant will have to be replaced. It is prudent management to plan for that event by gradually accumulating reconstruction funds so that money will be available when needed. However, citizens and elected officials may perceive the accumulation of funds as a sign that funding levels are too high and not as a sign of good management. A capital reconstruction fund can also be an easy prey when the need for special projects arises. Therefore it is important that citizens and elected officials understand and support the necessity of protecting a capital reconstruction fund from being tapped at will. Every effort should be made to avoid trifling with the long-term investment in a community's basic infrastructure in order to realize short-term gains.

Extension of Services

Planning decisions regarding sewer extensions and new interceptors are usually complicated by the inherent issues of growth and land use patterns. The meshing of the development of public facilities and growth management is an area in which community residents have a big stake and in which public involvement is necessary to avoid political problems later on. Additionally, during the actual construction phase, if an adequate inspection program is not in place a community may be saddled with leaky pipes that could later prove to be an enormous drain on the efficiency of the system. Informed citizens can insist that inspection programs are properly funded and managed.

Sludge Disposal

Disposing of the increased volume of sludge generated by improved treatment levels has been difficult for many communities. Citizens who are involved in developing solutions to this problem and who learn about new techniques are likely to be able to help develop acceptable solutions. After that involvement, concerned citizens can be even more valuable as they play a leading role in helping to convince the public at large to agree with such plans and accept the solutions agreed upon.

Industrial Wastes

The problem of industrial wastes plagues the operation of many treatment systems. In assessing the severity and dimensions of the problem and in determining potential solutions, productive results are likely to be achieved if careful attention is given to involving the public who understand the different points of view concerned. Citizens involved in this process can serve as catalysts in obtaining necessary compromises between the different interests affected.

Interjurisdictional Disputes

Many plants serve more than one locality and troublesome issues can be raised over the equitable sharing of responsibility for financing and management of the system's operation. These disputes mirror the difficulties that were often encountered in the construction of plants to serve regional areas.

Citizens from all jurisdictions who are involved in analyzing the issues that are in dispute and who help to develop recommendations for a solution to the problems can be very useful in working for a result that is acceptable to all parties.

Planning to Involve Citizens

As in all planning, there are certain steps that should be undertaken to make sure that an effective approach for involving citizens is designed. Elements that should be considered include the following (not necessarily sequential) steps which are amplified below:

- Decide when the public should be involved;
- Determine the purpose of involving the public;
- Decide which segments of the public to involve;
- Identify the resources available for public involvement;
- Select appropriate techniques to use; and
- Identify who will manage public involvement activities.

When to Involve the Public

Before a major effort should be initiated towards the general public or community groups, it is important that wastewater system managers obtain at least the tacit approval of their local governing body. A public involvement effort is a political activity and it is necessary that it be managed with sensitivity to the local political situation. If a system manager is interested in a formal public involvement program, it is most likely to be successful if the groundwork has been laid previously through developing good working relationships with elected officials and by keeping them informed of developing issues.

Involvement is best when it is tied to key decision points, although it may also be appropriate at other times, such as in an educational program that lays the groundwork for future decisions. The key points where public involvement is most useful are:

- Clarifying and developing issues;
- Defining problems;
- Articulating goals;
- Developing alternative solutions;
- Recommending a preferred solution;
- Advocating a course of action; and
- Monitoring implementation.

Once the key point from this list has been identified for public involvement, then a review of more specific objectives such as those listed below should help in developing a clear idea of just what it is hoped to accomplish by involving citizens. Without clear objectives, public involvement is likely to be unfocused and frustrating for public officials and citizens alike.

If a course of action is deemed desirable but is perceived as politically unpalatable, it may be preferable for involved citizens to take a leading role in advocating the action, thus laying the groundwork for public officials to follow suit. However, for this strategy to be acceptable it is necessary that a mutually supportive relationship between citizens and officials already exist.

The Objectives of Public Involvement

Citizens who involve themselves in government affairs and government officials who seek citizen input do not necessarily have similar objectives in mind. Citizens may have broad goals that include the general improvement of government programs, but they can also be motivated by a single objective such as blocking a particular project, lowering tax rates or sewer charges, checking the power of special interests, or furthering an individual political career.

Public officials may share some of the same goals or they may have different purposes. Their efforts to involve the public may stem from a need to fulfill legal requirements, to enhance public acceptance of a program or decision, or it could be to delay or avoid making difficult decisions.

It is only when citizens and public officials share the same goals that the true benefits of public involvement are realized. The negative experiences with public participation by both citizens and government officials usually occur when the two groups use the exercise to achieve different, often conflicting, purposes.

The objectives selected will depend on the key decision point that is to be the focus of involvement. As listed earlier, objectives can be considered to revolve round three major areas:

- to fulfill legal requirements
- for political prudence
- to gather information

Decide Whom to Involve

Sometimes public involvement programs are criticized as being deficient because a few citizens with narrow views cannot properly represent a community. Furthermore, if general public approval is needed for a particular decision or program, a process that rests on limited public views may lead to unnecessary conflict with those who were interested but were excluded from involvement. Further criticisms can arise if agencies become too cozy with, or appear to be captured by, special interests.

None of these charges should hold up when public involvement is properly designed and well managed. Hence, part of that design must be an early consideration of whom to involve, which, of necessity, depends on a clear articulation of the objectives of involving the public.

The people who may be involved can include a wide variety of interests that may be loosely grouped as follows: (Media representatives can play an extremely important role in public involvement, but since their function is primarily as a conduit rather than as an active participant they have been excluded from the following list.)

- Elected officials;
- Private citizens--the general public;
- Affected citizens or groups--program clients, or those with an economic stake in the program or decision to be made (businesses, landowners or other special or minority interests);
- Experts and agency personnel; and
- Organized citizens--civic groups.

While it may be that all possible interests do not need to be involved, a conscious decision on how to target participants should be made only after reviewing all possible groups in the community. Deciding whom to involve should be considered in light of long-term and short-term objectives. And in addition, careful consideration should be given to the community's citizen resources, its individuals, organizations, businesses and communication networks as well as special needs. An important consideration is the time that community members have available to contribute and their potential for leadership roles.

It is useful to develop a list of citizens, experts, media and civic groups (such as the League of Women Voters, Chamber of Commerce, Civic Associations, Rotary Club, Taxpayers Group) to have available for targeting particular segments of the community. However, waiting until a public involvement activity is underway may result in the need for a list on very short notice so that citizens with much to offer can be missed. A "good" list is an invaluable resource. It should be developed early and kept up to date so as to be readily available when needed.

Assess Available Resources

Public involvement activities can be very time consuming--both in terms of hours spent by government officials and citizens, and in terms of weeks and months taken to complete a task. Therefore it is important to review the amount of staff support that can be expended on managing public involvement activities as well as the time schedule within which the desired objectives are to be achieved. In addition to funds and staff time, consider also the skills that government officials have. Some public involvement activities require a fairly highly developed level of interpersonal skills, in either staff or citizen leaders, such as in facilitating the resolution of conflict or managing group interaction. A necessary skill for any successful public involvement program, of course, is the ability to listen--on the part of both officials and citizens.

Identify Who Will Manage Public Involvement

In designing a public involvement or awareness program it is necessary to coordinate with other agencies or staff who might be doing similar activities. If there is a Public Affairs or Community Relations office it is important that wastewater system managers establish good relationships with the staff so as to be able to rely on their skills when needed, and to develop in them an understanding of wastewater management issues and the public involvement approach being used. Similarly, a public involvement program should be at least acceptable to, if not managed by, those who will be responsible for reacting to the results of that involvement. It is also best to have one staff person who is assigned to serve as the contact point for citizens who might have questions about the issue or program.

Select Particular Techniques

Once the objectives of involving the public are clearly articulated, the public who should be targeted has been identified, and the amount of resources that can be used for public involvement has been assessed, then a decision can be made regarding the particular activities to be undertaken. It is important to note that there is no one "perfect" activity that can be relied on every time. Each objective should be seen in the context of local circumstances and then the specific activities that are most likely to achieve the desired results at a particular time should be selected. Some activities are more time consuming or costly than others, some are more politically acceptable than others and some have a greater potential for producing new ideas.

Ways of involving the public are limited only by the imagination of local government officials, and techniques should be selected with a careful eye to their advantages and disadvantages, their potential benefits and their limitations. The next section of this chapter describes a range of possible activities and is followed by suggestions for their use.

An Inventory of Public Involvement Activities

A categorization of activities is useful for matching particular techniques to specific objectives. Activities can be described as information giving or information receiving (or both), they can have a broadly or narrowly targeted audience, and they can be conducted formally or informally. One grouping that illustrates the range of possible activities is given below:

Information Receiving Activities

Public hearings
Public meetings or workshops
Referenda
Surveys, questionnaires, or polls
Interviews

A call-in radio program
Task forces or advisory groups
A talent bank

Information Giving Activities

Press releases or conferences
Interviews with editors or reporters
Radio or TV talk shows or announcements
Advertisements and legal notices
Films, slide shows and documentaries
Speakers bureaus
Advisory groups or task forces
Public briefings, meetings or workshops
Fact sheets, brochures or citizen handbooks
Newsletters
Direct mail
Signs, posters or billboards
Preparation of educational materials for use in schools
Tours
Exhibits
Events, such as an "Environmental Awareness Day"
Public information or drop-in centers
Responsiveness summaries[1]

Informal Activities

Consulting informally with citizens
Being available to assist community groups
Keeping open records and files
Establishing contacts with influential citizens or groups
Establishing good relationships with reporters and editors

Suggestions For Using Particular Techniques

This section gives detailed suggestions for some of the more commonly used techniques. Selected references are also provided for those who wish to pursue further information about these, or other, public involvement activities.

Public Hearings

Public hearings are often considered to be strictly "information receiving" activities in the most formal sense and may require signing up ahead of time for the presentation of prepared testimony. However, hearings need not be so formal and can be handled in less structured ways. It is also possible to use a hearing as an information giving activity by including a presentation of the issue at the beginning and also to permit a certain amount of interchange between officials and the public. A skilled moderator can even achieve an interchange to approach a true debate. At their worst, public hearings can be a frustrating experience for citizens, who may speak to empty chairs or listen to decisions being made immediately following a hearing that had obviously been decided beforehand. At their best, public hearings can produce a real dialogue between officials and citizens when time and management permit opinions to be incorporated into decision makers' thinking.

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[1] Responsiveness summaries give staff responses to citizen comments or suggestions and show how those comments were considered in decision making.

A hearing should be tied to a specific decision. To obtain citizen views on issues not yet at the decision point, other activities, such as workshops or surveys, are preferred. A formal public hearing is best if it is the culmination of a series of carefully designed public involvement activities, rather than a "stand alone" activity. Prior efforts should have included informing the public about the issue to be heard, possibly involving them in developing a range of alternatives or recommendations for consideration. In that setting it can provide carefully thought-out public viewpoints and suggestions.

Sometimes officials feel that legal requirements mean that a hearing must be held even though the decision to be heard has to all intents and purposes been made. To invite public comment under such circumstances is to invite trouble. Every effort should be made to plan legally required hearings far enough in advance so that the public comment received can be adequately considered before a decision is made.

Formal hearings can be intimidating for citizens, and public officals should take whatever steps they can in arranging the location and room design so as to minimize the impression of an adversarial and authoritarian relationship that otherwise may be created.[2] It may be helpful to have a staff person assigned to meet people as they come in and to circulate and be available to answer questions. This can provide the side benefit of establishing informal contacts with citizens and reporters.

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[1] For some good suggestions about how to write public notices see "How to Write a Public Notice: A Collection of Examples," Office of Water Program Operations, EPA, Washington, DC. 1979

[2] For suggestions about room arrangements for hearings, meetings or workshops see "Techniques of Public Involvement," Council of State Planning Agencies, State Planning Series #11, Washington, DC. 1977

Advantages of Public Hearings

- Provide opportunities for public input prior to decisions
- Can provide documentation of citizen values and attitudes
- Are open to all citizens
- Give special attention to specific decisions
- Give citizens an opportunity to hear all sides

Disadvantages of Public Hearings

- Easy to leave till too late in the decision-making process
- Formality may impose authoritarian atmosphere
- Citizens may be "turned off" by having to wait too long to speak
- May be dominated by a vocal minority
- Do not reach uninvolved citizens
- Can be used by individuals to "grandstand" for political purposes

Public Meetings and Workshops

Public meetings and workshops that are carefully planned to attract and interest the desired audience can have very productive results. They can be carried out with different formats depending on whether they are to be used with information giving, information receiving or problem solving as their primary purpose.

For information giving, a well planned and rehearsed presentation with visual aids that explain technical aspects in lay terms should be used. An alternative approach is to present a panel of experts who can discuss and present different perspectives on a topic. For this to work well, a short background presentation should be given at the start, and the discussion should be handled by an experienced moderator. Each approach will benefit if handouts on the topic are provided and if adequate time is allowed for questions to be answered. Evaluation or comment forms can also be distributed to obtain additional feedback.

For a meeting or workshop whose purpose is interaction followed by agreement or consensus, the room arrangements and atmosphere can be important. Participants should be arranged in small groups around tables and coffee or refreshments may be provided. A process for the session should be carefully developed that includes an agenda and an outline of the procedures to be followed. The agenda should be explained to the participants along with a short briefing on the issues at the beginning of the session (or it could be mailed ahead of time). It can be useful to appoint a recorder and/or discussion leader for each group, and a discussion outline or list of discussion questions may be provided.

Whichever approach is chosen, it is necessary that the audience be properly identified and targeted. If the audience is to be the entire community, newspaper or radio announcements can be made, or announcements could be included with sewer charge bills. If the audience is a more restricted group, then announcements or invitations can be mailed directly, or personal phone calls made. Community groups may also be willing to carry announcements in their newsletters, or to sponsor a meeting or workshop.

A registration requirement can be used if it is necessary to cover costs of the event if space is limited, or if a meal will be provided for which a head count is needed.

Advantages of Meetings and Workshops

- Can be used effectively in combination with other techniques
- Permit establishment of personal contacts
- Can be used to resolve conflicts
- Is difficult for special interests to dominate

Disadvantages of Meetings and Workshops

- Need very careful planning and preparation
- Time consuming for staff and the public
- May require special skills in group dynamics

Obtaining Information From The General Public

The previous activities describe methods that can obtain information from the public -- but probably only from those actively interested in a particular issue. Sometimes, however, it is necessary to elicit opinions or information from the public at large. There are several techniques that can be used to gather information of this nature and different techniques are appropriate for different needs. For instance, a comprehensive needs assessment could be undertaken prior to system expansion or service area extension in conjunction with planning for other public facilities.1/ Less comprehensive information about citizens or their opinions can be obtained through, for example, the use of short questionnaires included with water bills, or printed in community newspapers or newsletters, or through a brief telephone survey. Another approach is to stage a call-in radio show. Conducting on-the-spot interviews on a busy street corner or by going door-to-door can also provide information on community opinions or needs.

1/ For suggestions about needs assessment techniques see "Coping With Growth: Community Needs Assessment Techniques," Oregon State University, Western Rural Development Center, Corvalis, Oregon, 1980. See also "How Effective Are Your Community Services? Procedures for Monitoring the Effectiveness of Municipal Services," Urban Institute and International City Management Association, Washington, D.C. 1977.

Whatever the approach, the questions formulated should be free from bias and a sample population should be chosen that is charcteristic of the targeted population. If a mail-in approach is used, the response rate will increase if the response package includes a self-mailer, or if follow-up is provided to non-responders.

Advisory Groups And Task Forces

The use of citizen committees has become a popular, if somewhat overused, technique of public involvement. Groups can be roughly categorized according to their several potential functions:

- Inform citizens about issues
- Obtain general citizen advice
- Obtain advice from a selected perspective
- Develop and undertake an action campaign
- Conduct research or fact-finding
- Perform a general review

Membership will depend on the particular purpose of the group and the process of selecting members is important so that the activities of the group will be well received by the wider community. Membership should include people who have the time available to give to the task including doing the necessary homework and exercising leadership when required. Members should thoroughly understand their community, the role of the group, attend meetings and be able to mobilize community support. Advisory groups can be invaluable in helping to define broader public involvement programs.1/

Before an advisory group or task force is established, several items need to be decided. These include:

- Membership: - which segments of the community to include
  - how they will be selected

- Purpose: - a clearly defined charge should be prepared that indicates whether the purpose is for planning, information transfer, policy advice, problem solving, conflict resolution, mobilizing public support or undertaking a broad public awareness campaign.

- Duration: - when will the group start and finish
  - how will length of membership terms be established

1/See also "Working for Clean Water: The Role of Advisory Groups -- A Citizen Handbook," Pennsylvania State University, Institute of State and Regional Affairs, Middletown, Pa. 1980.

- Operation:
  - will meetings be regular or occasional
  - who will lead meetings
  - who will develop agenda and keep track of actions
  - who will carry out recommended actions
  - how much and which staff support will be provided
  - how will members be brought "up to speed" and their interest maintained

Sometimes permanent advisory bodies are established whose only function is to advise -- but specifically on what is never determined. This situation should be avoided, and a specific charge should be given to the group at the outset. A danger also exists with permanent advisory groups, in that leaders of the group may begin to perceive themselves in a quasi-staff role with management functions. If this occurs, the only recourse may be, in the end, to abolish the group. Therefore, it is best to guard against such an occurrence by structuring the group and defining its function so that the role of group members is quite clear from the beginning.

Advisory groups are popular because of their multiplicity of function and apparent ease of use. However, beside their many advantages there are some significant disadvantages that should be considered before one is established to make sure that an advisory group is indeed the best technique for a given purpose.

Advantages of Advisory Groups and Task Forces

- Can provide useful interchange and dialogue between government officials and citizens
- Can raise difficult but important issues, potential solutions and ways of approaching problems
- Establish personal contacts with individuals in community
- Can help encourage wider public involvement
- Can help achieve consensus or compromise on difficult issues
- Can be a useful sounding board for staff members

Disadvantages of Advisory Groups and Task Forces

- Require skilled leadership
- Members do not necessarily represent the community
- Can be very time consuming for staff
- Can be very demanding on citizens who may "burn out"
- Can become a delaying agent
- Special interests or vocal individuals may dominate
- May become a rubber stamp
- May be used as a political springboard

Public Education/Information Programs

This broad category of activities is designed to provide citizens with information about government programs, services and needs. Short term activities can be geared to a specific issue, or continuing activities can be used with the objective of improving a general image. Programs can be beamed to the public at large by using the media or they can be geared to more specific sections of the community through membership in particular age groups or organizations or by residential location. Members of organizations can also be reached through their newsletters or bulletins.

Any promotional campaign requires careful planning. If the media will be the main avenue for communications, each of the three vehicles (press, radio and television) should be explored. Competition for news and feature space may be heavy, so it pays to make it easy for reporters or editors to cover activities. All the media in the community should be identified, perhaps by using a file card system. The appropriate contacts should be determined, when deadlines must be met and in what format material is needed. It may be helpful to hand carry releases to an editor as this permits the establishment of personal contacts with media staff.

There are certain "rules" governing the format for news releases or announcements. Some of these are described below:

- Include, at the top of the page, organization or agency name, phone number and name and phone number of a contact person
- Leave two inches of white space at the top of the page
- Type double-spaced, one side only, with wide margins
- If the release runs more than one page type "MORE" at the end of the page(s) to be continued (in this case put a page number and one-word identifier at the head of each succeeding page)
- End pages only at the end of a paragraph
- At the end of the release type "END", "30", or "###"
- Headlines may be included
- A fact sheet may be attached for background information

Sometimes it can be useful to submit a photograph - but only high quality pictures should be used. A good black and white picture is preferable. A caption should be written on a piece of paper taped to the photograph.

Radio and television releases have similar formats with the addition of an airtime estimate typed in the upper left of the first page. (This is approximately 10 seconds for each 20-25 words). If slides are submitted (one for each 10 seconds), allow additional space in the left hand margin of the copy and in that space identify which slide goes with which part of the text. Be sure to specify if slides are to be returned.1/

1/More detailed suggestions for publicity campaigns specifically geared to wastewater treatment can be found in "Public Information Handbook," Water Pollution Control Federation, Washington, D.C. 1977.

Special publications can be produced for a variety of uses. These include fact sheets, brochures, citizen handbooks, kits for school use or periodical newsletters. The purpose of the publication and how it will be produced and distributed should be decided well in advance. A regular newsletter included with water or sewer bills is a simple way to reach all customers of a wastewater treatment system unless a postcard billing is used, in which case separate mailings would be necessary.

Public education can also be accomplished by opening system facilities to the public either by promoting tours or by holding an open house. In either event, a guide or host (possibly a volunteer) should be trained and prepared to explain the facilities to visitors. An exhibit (which could be portable) could be developed to describe the system's operation. Safety considerations should be included for all events that bring the public onto facility sites.

Advantages of Public Education Programs

- Can provide brief or indepth information to the non-involved public
- Emphasis can be placed on public service and educational aspects
- Can reach a large number of people
- Can, over time, develop a generally supportive attitude in the public at large

Disadvantages of Public Education Programs

- May take a long time to be effective
- Can be expensive
- Provide only one-way communication

Government officials can make a variety of other efforts to involve the public in planning and decision making that include a range of formal and informal activities from visiting civic associations to encouraging public attendance at official meetings and making public records and reports widely available to the general community. In addition there may be influential community groups or individuals that are interested in particular issues who may benefit from technical assistance or training that government officials can provide. Establishing personal contacts with these groups and individuals is a necessary component for improving community support for operation and management.

A local government that makes a concerted effort to operate in the open and solicit--and use--community input whenever appropriate should be in a good position to call on its citizen leaders to assist in solving thorny local problems such as those that surround improving the management of wastewater treatment systems.

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